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COMMUNITY BASED WATERSHED MANAGEMENT AND POVERTY ALLEVIATION: A STUDY OF SUJALA WATERSHED PROJECT IN KARNATAKA

Thesis Submitted to the Kannada University,
through the Department of Development Studies, Hampi

For the Degree of
Doctor of Philosophy in Economics

By
C.H PATIL
M.A., M. Phil

Under the Supervision of
Prof. NAYANATARA S. NAYAK
M.A., M.Phil., Ph.D.

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DECLARATION

I declare that the thesis titled "**Community Based Watershed Management and Poverty Alleviation: A Study of Sujala Watershed Project in Karnataka**", is the result of my own work carried out at the Centre for Multi-Disciplinary Development Research (CMDR), Dharwad, Karnataka, and that it has not either wholly or in part been submitted for any other degree or diploma. Due acknowledgment has been made whenever anything has been borrowed from other sources.

Date: 19-12-12

(C.H Patil)

CERTIFICATE

This is to certify that the thesis titled "**Community Based Watershed Management and Poverty Alleviation: A Study of Sujala Watershed Project in Karnataka**", is a bonafide research work carried out by Mr. C.H.Patil independently under my guidance and supervision. I also certify that this has not been previously submitted for the award of any degree, diploma, associateship or other similar title.

Date: 19-12-12

Prof. Nayanatara Nayak
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C H Patil

CONTENTS

1 **Chapter – I : INTRODUCTION** 1 - 11

1.1 Introduction

1.2 Watershed Development

1.3 Sujala Watershed Project (SWP) in Karnataka

1.4 Research Questions:

1.5 Objectives:

1.6 Methodology:

1.7 Outline of the Study

1.8. Limitations of Study

2 **Chapter – II : WATERSHED DEVELOPMENT AND EVALUATION A THEMATIC REVIEW** 12-45

2.1 The concept of Watershed and Watershed management

2.2 Watershed Development Programmes in India: A brief introduction

2.3 Evaluation of Watershed Development Programmes: Methods and Approach

2.4 Review of Studies

2.5 Selection of Indicators

2.6 Watershed Development: Community Management and Collective Approach

2.7 Watershed Development Programmes and Socio-Economic Benefits

2.8 Watershed Development and Poverty Alleviation

2.9 Conclusions

3 **Chapter – III : SAMPLING DESIGN AND METHODOLOGY** 46-55

3.1 Methods

3.2 Indicators

3.3 Sampling Design

3.4 Data Sources

3.5 Statistical methods

4	**Chapter – IV : PROFILE OF STUDY AREA**	**56-77**
	4.1 Introduction	
	4.2 District and Selected Taluks Profiles	
	4.3. Profile of the Selected Villages for the Study (Amblikoppa and Devaragudihal Sub-Watershed)	
	4.4. Profile of Selected Micro Watersheds	
	4.5. Profile of Selected Respondents in the Study Area	
	4.6 Conclusion	
5	**Chapter – V : SUJALA WATERSHED DEVELOPMENT PROJECT AN OVERVIEW**	78-103
	5.1 Introduction	
	5.2 Watershed Programme – A Priority Programme in India	
	5.3 Sujala Watershed Development Project	
	5.4 Conclusion	
6	**Chapter – VI : IMPACT OF SUJALA WATERSHED DEVELOPMENT PROGRAMME EMPIRICAL FINDINGS AND PERCEPTIONS OF THE COMMUNITY**	104-164
	6.1 Introduction	
	6.2 Agricultural background and features	
	6.3 Livestock Holding	
	6.4 Labour	
	6.5 Migration	
	6.6 Wage Rates	
	6.7 Training for Self Employment and Support Activities	
	6.8 Household Asset holdings	
	6.9 Annual Income of Households before and After Implementation of Sujala Watershed Project	
	6.10 Household Credit Position of Beneficiary / Non-Beneficiary households	
	6.11 Household Savings of Sujala Watershed Beneficiaries and Non-beneficiaries	
	6.12 Benefits from 'Sujala' Watershed Project	
	6.13 Overall implications of SWP on poverty status	
	6.14 Community organization and participation	
	6.15 Ranking of Facilities required in the villages According to the Preferences of respondents (%)	

6.16 Perceptions of Beneficiaries on Sujala Watershed Project
6.17 Awareness of Sujala Watershed Program among Beneficiary and Non-beneficiary Groups
6.18 Role of Non-Government Organizations in the Implementation of Sujala Watershed Project
6.19 Revelations from Focused Group Discussions (FGDs)
6.20 Conclusion

7 **Chapter – VII : SUMMARY OF FINDINGS, CONCLUSIONS AND SUGGESTIONS** 165-176
7.1 Introduction
7.2 Main findings of the study
7.3 Limitations and suggestions for Policy Implications

8 References: 177-189

9 Questionnaire & FGD checklist 190-213

LIST OF TABLE

Sl.No.	TABLES	Page No.
1	Table 2.1 Indicators for Impact Assessment of Watershed Programmes	34
2	Table 2.2 Evidences of Positive Impacts of WSD Projects	40
3	Table: 3.1 Sub watersheds covered under Sujala Phase III in Dharwad district under Northern Transition zone	50
4	Table 3.2: Taluka wise Selected of Sub watersheds	50
5	Table 3.3 Sample Framework	51
6	Table 3.4: Distribution of HHs according to Beneficiary and Non beneficiary	52
7	Table 4.1: Profile of Dharwad District and Selected Taluks	58
8	Table 4.2: Agricultural Activities in Dharwad District and Selected Taluks	60
9	Table 4.3: Occupation and Distribution of the Workers in Dharwad and Hubli Taluks	61
10	Table 4.4: Demographical details of selected sub-watersheds	62
11	Table 4.5: Distribution of Farmers based on Farm Size	63
12	Table 4.6: Social/Community Groups in Amblikoppa & Devaragudihal	63
13	Table 4.7: Progress of Sujala Watershed Project	64
14	Table 4.8: Targets and Progress of Sujala Watershed Project in the Village	66
15	Table 4.9: Socio-Economic Profile of Selected Micro Watersheds	67
16	Table 4.10: Community Participation in Selected Micro Watersheds	68
17	Table 4.11: Targets and Progress of Selected Micro Watersheds	69
18	Table 4.12: Distribution of Households According to Beneficiary and Non-Beneficiary Respondents the Study Area	70
19	Table 4.13: Distribution of Family Members of Respondents According to Age	72
20	Table 4.14: Distribution of Heads of Households Members According to Educational Status	74
21	Table 4.15: Occupational Status of Respondent Households	75
22	Table-5.1: Total Project Investment in Sujala Watershed (Rs. in Crores)	81
23	Table-5.2: District-wise Selection of Watersheds	85
24	Table-5.3: Breakup of Land Treated by District During Phase III (Area in ha)	86
25	Table-5.4: Phase-wise Sujala Watershed Sanghas and Executive Committees Formed	87
26	Table-5.5: Area Groups Formed in Different Phases	88
27	Table-5.6: Watershed Areas Treated Under Phase III	88
28	Table-5.7: Works Carried out in Selected Micro Watersheds	89
29	Table-5.8: Crop Intensity by Zones	90
30	Table-5.9 : Beneficiary Contribution to Total Expenditure	92

31	Table 5.10: Beneficiaries Average Contribution to Total Expenditure (Rs)	93
32	Table 5.11: Activities of Farmers under Sujala Watershed Project	95
33	Table 5.12: Land Areas of Activities Covered Under SWP	97
34	Table-5.13 Beneficiary Coverage under Sujala Watershed Project	98
35	Table-6.1Distribution of HHs according to Size of Agricultural Land Holdings (%)	106
36	Table 6.2 Total cultivated area under major crops in acres Total cultivated area under major crops (in acres)	109
37	Table 6.3. Crop Yield (per acre)	111
38	Table 6.4 Value of agriculture crop (Rs.)	113
39	Table 6.5 Area under irrigation (in acres)	115
40	Table 6.6 Cropping Intensity under Sujala Watershed Project	116
41	Table-6.7 Newly Introduced Crops in Sujala Watershed Program	117
42	Table-6.8 Seedlings Planted under Horticultural and Forestry Activities	118
43	Table-6.9 Distribution of Households According to Livestock Holding (Nos.)	120
44	Table 6.10 Annual Produce from livestock rearing (Milk in Litre & Dung in Kg)	121
45	Table 6.11Average annual earnings from livestock produce (Rs.)	122
46	Table-6.12 Total Labour Used in Agricultural Activities (man days)	123
47	Table-6.13 Average Annual Man days of Work per beneficiary and non beneficiary	124
48	Table-6.14 Average Days of Gainful Employment for Landless in Sujala Watershed Project villages	125
49	Table-6.15 Additional Employment Gained Due to SWP (man days)	126
50	Table-6.16 Total Number of Days Migrated in Search of Employment	127
51	Table-6.17 Average Wage Rate in Sujala Watershed Project Villages	128
52	Table-6.18 Training for Self Employment and Support Activities (No of HHs)	129
53	Table-6.19 Support Given by the Organization After Training (No of HHs)	129
54	Table-6.20 Satisfaction over Self Employment Training under SWP (No of HHs)	130
55	Table-6.21 Distribution of Households According to possession of Household Assets	132
56	Table-6.22 Distribution of Households According to Agricultural Assets Holding	134
57	Table-6.23 Annual Income of Households Before and After Implementation of Sujala Watershed Project (Rs.)	136
58	Table-6.24 Annual Income of Households in Constant Prices (Rs.)	138
59	Table-6.25 Distribution of HHs according Income groups (Annual)	139

60	Table-6.26 Household Credit Position of Beneficiary/Non-Beneficiary Respondents	140
61	Table-6.27 Total Cumulative Savings of Beneficiaries and Non-beneficiaries of SWP (Rs.)	141
62	Table-6.28 - Benefits of Sujala Watershed Project	143
63	Table 6.29 Summary of direct and indirect Benefits	144
64	Table 6.30: Distribution of Households according to Standard of Living Index or level of economic status	147
65	Table-6.31 Membership of SHGs in Amblikoppa and Devaragudihal Before and After SWP	151
66	Table-6.32 Households Receiving Loan from Self Help Groups (%)	151
67	Table-6.33 Perceptions of Beneficiaries on Sujala Watershed Project (%)	157
68	Table 6.34 NGO involvement in SWP activities	161

LIST OF CHARTS

Sl.No.	TABLES	Page No.
1	Fig 2.1 Hydrological Cycle in a Watershed	14
2	Fig. 2.2. The Sustainable Livelihood Approach Framework	26
3	Fig-4 Distribution of Household according to beneficiary and non beneficiary	71
4	Fig-4.2 Distribution of Household members according to their Educational qualifications.	73
5	Fig-4.3 Distribution of Head pf Household members according to their Occupational status.	75
6	Fig. 5.1 Mango plantation and fodder raising at Amblikoppa	100
7	Fig. 5.2 Diversion canal at Amblikoppa	100
8	Fig 5.3 Rain Water Harvesting at Amblikoppa	101
9	Fig. 5.4 Stone Bunding at Amblikoppa	101
10	Fig. 5.5 Gokatte at Devargudihal	102
11	Fig 5.6 Check Dam at Devargudihal	102
12	Fig 5.7 Stone bunding at Devargudihal	103
13	Fig 5.8 Borewell Recharge Pit at Devargudihal	103
14	Fig.6.1 Additional employment gained due to SWP (No of man days)	126
15	Fig.6.2 Average annual Income of Households Before and After Implementation of SWP	137
16	Fig. 6.3 Direct benefits from SWP	145
17	Fig-6.4 Participation of farmers in community watershed management (Amblikoppa)	152
18	Fig-6.5 Participation of farmers in community watershed management (Devargudihal)	153
19	Fig-6.6 Awareness of SWP according to source	159

LIST OF ABBREVIATION

Abbreviations	Expansion
AFC	Agricultural Finance Corporation
AG	Area Group
ATMA	Agriculture Technology Management
BPL	Below Poverty Line
BCR	Benefit Cost Ratio
BAIF	Bharatiya Agro Industrial Foundation
BDSSS	Belgaum Diocesan Social Service Society
BIRDS	Bijapur Integrated Rural Development Society
CBOs	Community Based Organisations
CDZ	Central Dry Zone
DANIDA	Danish International Development Agency
DDP	Desert Development Programme
DFID	Department for International Development
DPAP	Drought Prone Area Development Programme
DWDO	District Watershed Development Officer
EAS	Employment Assurance Scheme
EC	Executive Committee
EDP	Entrepreneurship Development Programme
EDZ	Eastern Dry Zone
EPA	Entry Point Activity
FGD	Focus Group Discussions
FYM	Farm Yard Manure
GOI	Government of India
GIS	Geographical Information System
GOK	Government of Karnataka

GP	Gram Panchayat
IRR	Internal Rate of Return
IFPRI	International Food policy Research Institute
ICAR	Indian Council for Agricultural Research
JSYS	Jal Samvardhan Yojana Sangh
Ha	Hectare
HRD	Human Resources Development
IBRD	International Bank for Reconstruction and Development (World Bank)
ICR	Implementation completion report
IDA	International Development Assistance
IGA	Income Generating Activity
ISRO	Indian Space Research Organisation
IWDP	Integrated Wastelands Development Project
IWMP	Integrated Watershed Management Programme
KAWAD	Karnataka Watershed Development Project
KVK	Krishi Vigyan Kendra
LPCD	Liter per day per person Consumption of Water
ME &L	Monitoring, Evaluation and Learning
MFP	Minor Forest Produce
MGNREGA:	Mahatma Gandhi National Rural Employment Guaranty Scheme
MIS	Management Information System
MWS	Micro Watershed
MYRADA	Mysore Resettlement and Development Agency
NGOs	Non Governmental Organisation
Nos	Numbers
NPV	Net Present Value
NTZ	Northern Transition Zone

NWDPRA	National Watershed Development Project for Rainfed Areas
PAD	Project Appraisal Document
PPP	Public Private Participation
RVP	River Valley Project
SC	Scheduled Caste
SHG	Self help group
SLA	Sustainable Livelihood Approach
ST	Scheduled Tribe
SWAP	Sujala Watershed Action Plan
SWS	Sub watershed
TERI	The Energy Research Institute
UNDP	United Nations Development Programme
UNICEF	United Nations International Children's Emergency Fund
WDD	Watershed Development Department
WDF	World Development Fund
WASSAN	Water Support Services and Activities Network
WUS	Water Users Sangh
WGDP	Western Ghat Development Programme
ZP	Zilla Panchayat

CHAPTER - 1
INTRODUCTION

1.1 Introduction

Sustainable agriculture and rural development are essential to the implementation of an integrated approach to increasing food production and enhancing food security and food safety in an environmentally sustainable way. Agriculture and allied activities play a crucial role in addressing the needs of a growing population and are linked to poverty eradication. The watershed development programmes introduced in India, particularly in recent times are designed considering the above issues and aim at supporting sustainable livelihoods in rural areas through integrated and community (people) oriented approach to watershed development.

In India watershed management is viewed as a tool to improve agricultural productivity in the region and to upgrade and enhance livelihoods options in the rain-fed and drought-prone regions. The strategy is to promote diversity of crops, horticulture, livestock and wage employment through creation of assets and water harvesting structures. Watershed management programmes include de-silting of community tanks for enhancing storage, construction of check-dams for infiltration of surface water, farm ponds for storing rain water and to increase soil moisture, bunds and terraces for soil and water conservation, afforestation and social forestry for increasing vegetation cover, supply of fertilizers, seeds, seedlings, etc. Often watershed programmes do not yield desired results due to lack of community for whom the programmes are designed. This is because the returns to investments on watershed programmes are realized in the long run. And the benefits are not targeted at one individual, but the whole community. Everybody thinks the gain is not theirs and hesitate to contribute in cash or kind for the programme. "Sustainable management of resources requires institutional mechanisms for fostering cooperation and coordination of the resource use, management and investment decisions among diverse stakeholders in the

community" (Shiferaw *et al.*, 2008) including line departments of the government, elected representatives, panchayats, villagers and selected beneficiaries. The level of existing community organizations in a village, awareness on social mobilization and, existence of social capital to ensure equitable access and utilization of watershed resources, perceived benefits of the intervention decide the extent of community participation in watershed programmes. To ensure success and sustainability of watershed development, several key factors such as creation of awareness in the community about the project, their involvement in planning and implementation, building of local institutions for project management in future (Kakade and Hegde, 1998), management and maintenance of created structures need to be addressed in project design before implementing the project.

Many centrally sponsored watershed programmes viz. Drought Prone Area Development Programme (DPAP), Integrated Wastelands Development Project (IWDP), National Watershed Development Project for Rainfed Areas (NWDPRA), Indo-German Watershed Development Project (IGWDP), Desert Development Programme (DDP), Employment Assurance Scheme (EAS), etc., were introduced during 1960s under Five Year Plans in addition to state specific watershed development programmes.

The National Rainfed Area Authority (NRAA) was established by Central government in 2006 to focus on improving the development of the rainfed areas of the country through well structured plan and interventions such as watershed treatments. The Authority addresses to sustainable and holistic development of rainfed areas, including appropriate farming and livelihood system approaches. It has set out guidelines, which are effective from 2008. The guidelines specify i) equity gender sensitivity aiming at inclusive approach, ii) decentralization iii) appointing facilitating agencies for social mobilization and community organization iv) community participation by involving primary stakeholders in planning, budgeting, implementation, and management of watershed projects

v)capacity building and technology inputs to enhance their knowledge and skills vi)monitoring, evaluation and learning vii) organizational restructuring by establishing appropriate technical and professional support structures at national, state, district and project levels. The above guidelines and the government's intention to bring in holistic and sustainable development have made current approach to watershed development in India to incorporate livelihood approach aiming at productivity enhancement and livelihoods. People and their development receive priority along with conservation measures.

Watershed management is an essential part of agricultural development in Karnataka as it is one of the states with high proportion of dry land in the country. Most of its northern districts are prone to frequent drought and out migration in agricultural off seasons in these districts in search of labour is a common phenomenon. Karnataka State therefore has a rich experience of managing watershed development programmes effectively viz. Karnataka Watershed Development Programme (KAWAD), **Western Ghat Development Programme (WGDP), River Valley Project (RVP), Nabard Assisted Watershed Development Project (NABARD)** and Sujala Watershed Development Project (SWDP) in addition to implementation of centrally sponsored programmes.

Palanisami *et. al.,* (2009) opine that benefits from watershed development activities are not limited only to the users/beneficiaries, but also extend to the non-participating farmers as the watershed development technologies are expected to have positive impacts on groundwater recharge, soil and water conservation, maintaining ecological balance, increased fodder availability, reduced siltation, increased greenery, increased crop yield, etc. And the increased agricultural production will benefit the non-farming community like labourers, rural artisans and other rural households. So according to them watershed development brings benefits not only to the producers (farmers) but also to the

consumers (farmers, labour households and other households in the watershed village).

Many other studies in the Indian context reveal benefit cost ratios to be favourable in watershed treated areas than non treated areas (Chandrudu (2010), Gowda and Satish (2011) , Jally *et al.* (1995), Ninan and Lakshmikanthamma (1994), Rama Mohan Rao *et al.* (1995), Reddy (2000), Sharma (1995), Singh *et al.* (1995), Swarnalatha *et al.* (1994), etc.

1.2 Watershed Development

"Management of a watershed entails the rational utilization of land and water resources for optimum production while causing minimum trauma to natural and human resources. Therefore, watershed management is the process of guiding and organizing land use and use of other resources in the watershed to provide desired goods and services without adversely affecting soil and water resources" (Vora, 2011).

Pater *et al.* (2005) define watershed "as the land that water flows across, through, or under on its way to a stream, river, lake or closed basin, marked by a topographical boundary around the elevational high points surrounding a common point where water collects into a channel. The movement of water is greatly influenced by the contour of land and geologic features such as mountains, valleys and hills. A watershed may consist of uplands, floodplains and a stream channel. Uplands often comprise more than 99% of the watershed's area, with the floodplain and stream channel making up the remaining 1%. Watersheds can have hills or mountains or be nearly flat. They may include farmland, rangeland, small towns, and big cities".

Oxford English Dictionary defines watershed as "An area or ridge of land that separates waters flowing to different rivers, basins or seas; a narrow elevated tract of ground between two drainage areas."

"Watershed management is a landscape-based strategy that aims to implement improved natural resource management systems for improving livelihoods and promoting beneficial conservation, sustainable use, and management of natural resources" (Shiferaw *et al.*, 2008). Watershed development provides an opportunity to generate employment and income through the development of desert area, wastelands, public and private land.

In India watershed development emerged out of the need to develop upper watershed and drought prone areas, which received less rainfall and less attention under irrigation oriented schemes that were taken up on a large scale under Five Year Plans to give a boost to Indian agriculture. Frequent droughts faced by the country during 1960s, compelled the policy makers to introduce several programmes to support people at least with subsistence living and to sustain agricultural production. Drought Prone Area Development Programme (DPAP), Integrated Wastelands Development Project (IWDP) and Desert Development Programme (DDP) were introduced mainly in areas receiving less rainfall and having larger desert area.

Poor management of watershed leads to less production from agriculture, forests, grass lands, siltation of rivers and lakes, low water table and resulting increase in poverty of the inhabitants. The three interdependent vital natural resources viz. soil, vegetation and water are most important and necessary for the existence of the human and animal life. The efficient management of these three resources on watershed basis i.e. watershed as the unit of management could result in balanced growth of the region.

1.3 Sujala Watershed Project (SWP) in Karnataka

Sujala Watershed Project was initiated in rainfed and drought prone regions of Karnataka in the year 2001 with tripartite cost sharing between the World Bank, Government of Karnataka and the beneficiaries in the ratio of 80:11:9 respectively. The World Bank assistance was in the form of loan to

Government of Karnataka. The project components as per the guidelines of the project documents included i) participatory watershed development (76.1%); ii) farming system intensification (5.8%); iii) income generation (10.8%) iv) and iv) institutional strengthening (7.3%). The project was designed on the model of Private People Public Participation (PPP). The model included NGOs as private agency, people representing the community and the state government representing the public sector. NGOs acted as facilitators by creating awareness, capacity building and guiding the community to attain the objectives of the project, while community was required to participate in planning, implementation, contribute towards expenses, manage funds, maintain the assets created and therefore was eligible to share the benefits of village common resources. Government invested on watershed development through the involvement of its departments like agriculture, watershed and research institutions to promote overall development of the project.

Many studies carried out on the project area have highlighted positive impact of SWP [AFCL, 2001; Devendrappa and Syed,2011; Gowda and Sathish,2011; Kalyan Kumar, 2007; Munikishore *et al.* 2008, Grant, 2007]. But, there are also studies, which doubt about the impact of watershed projects on reducing poverty, enhancing household assets, community participation, etc.,[Deshpande and Reddy,1994;Hope,2007 ;Kerr, 2002;Salah,2008].

Despite many efforts to develop methodologies to study the impact of watershed development projects on treated area researchers face problem with assessment viz. developing a framework to identify what impacts to assess, selecting indicators, discount rate, where to look for these impacts and selecting appropriate indicators to assess the impacts, their influence and assessing the overall impact of the project (Palanisami *et. al.,* 2009). Therefore, any attempts to study watershed impact, particularly micro watersheds adds on to the understanding of the challenges facing watershed treatment, which is essential

for developing further tools for designing, proper implementation and sustenance of the projects and to ensure returns to investment on watershed development.

In the background of the mixed outcomes and persisting problems of rural economy in coping with drought and difficulty in finding alternative livelihoods, an evaluation study of SWP was taken up as the project completed its full term (three phases) in 2009. Interest in the issue and logistics reasons of belonging to the project village were the reasons behind in taking up this study.

1.4 Research Questions:

The study tries to address the following research questions:

- Has the project resulted in increase in family income?
- Is there an increase in agricultural/irrigated area land cover and diversification of crops due to project implementation?
- Is there involvement of community in the management of watershed management?
- What is the status of watersheds created under the project?

1.5 Objectives:

The present study aims at understanding the linkages of community based SWP watershed management project on poverty alleviation.

The specific objectives of the study are;

- Measure the changes in economic status of the beneficiaries;
- Evaluate the nature and extent of community participation in watershed management;
- Study the extent of diversification taking place due to the watershed improvement;
- Analyse the socio-cultural changes associated with community based natural resource management strategies

1.6 Methodology:

1.6.1 Coverage

For the purpose of the present study the researcher selected Dharwad district for an intensive evaluation. Dharwad district consists of five taluks and the project is implemented in all the five taluks and, three phases of implementation have been completed. In the background of the limitations of the studies based on long recall capacity of the respondents the researcher covered a period wherein the recall capacity would be relatively higher for studying the socio-economic impact of watershed development intervention i.e. choosing the watersheds that have been treated and completed in the third (last) phase for an in-depth study. Two micro watersheds are selected from Hubli and Dharwad taluks. The specific micro watersheds chosen for the study are Amblikoppa watershed in Dharwad taluk and Devargudihal watershed in Hubli taluk.

The study follows 'before' and 'after' approach and 'with' and 'without' scenario for analyzing the changes in socio-economic and institutional indicators in watershed treatment area. In 'before' and 'after' approach, beneficiaries are asked to report their current socio-economic status by recalling and comparing their status earlier to implementation of the project. Beneficiaries are also requested to report on perceived benefits of watershed treatment in terms of increase in soil moisture, ground water level, improved vegetation in the village, their contribution and participation in management, involvement in micro finance, etc. The method of 'with' and 'without' approach involves comparison of data on selected indicators collected for beneficiaries/households in treated area with similar data on non beneficiaries/households in non treated area. The sample size includes 250 households representing 50% of households in each of the selected villages. Beneficiary households account for 80% of the sample, while non beneficiaries form around 20% of the total sample.

1.6.2 Data Sources:

The study is based mainly on primary sources of information with supporting inputs from project related documents and review of available studies. The required secondary data is obtained from the offices of the project implementing agencies and relevant government departments. These form the basis of analysis in Chapter IV focusing on bio-physical and institutional indicators. The primary data is collected from three sources. The quantitative data on socio economic indicators is collected from a survey of randomly chosen beneficiary and non beneficiary households in selected two villages.

The qualitative data is gathered through focused group discussions comprising of village elders, panchayat presidents, representatives of women's groups and youth. We included farmers and landless labourers in the household survey. The information from household was collected through administration of pilot tested schedules and the information from focused group discussions was collected through a well structured check list comprising of open ended questions. Thirdly, the researcher tried to capture the role of private agencies i.e. NGOs through an interactive discussion using a brief checklist to understand their role as facilitators.

1.6.3 Statistical methods

Descriptive statistics viz. sum, averages, percentages, cropping intensities, conversion of current prices in to real terms, etc., form the main components of statistical methods used in analyzing the results of the study. To convert current prices in to real terms the researcher used GDP deflator for 2004-05, Base =100.

1.7 Outline of the Study

The study is presented in seven chapters. This chapter **(Chapter I)** presents in brief the outline of the study with a brief introduction of Sujala Watershed project in the background of the concept of watershed and their

importance. The research issues, objectives, methodology and limitation of the study are discussed in brief followed by chapter descriptions.

In **Chapter II** a thematic review of select literature is presented discussing the conceptual framework for impact evaluation, indicators used for evaluation, methodology and thrust issues in watershed development from which we draw the methodology for conducting this study.

Chapter III presents methodology of the study with approach, indicators, sampling frame, sample size, area covered, method of data collection and statistical methods used in the study.

Chapter IV describes the profile of the study area and villages covered in the study.

Chapter V gives a detailed account of the Sujala Watershed Project narrating its objectives, financing, coverage, activities undertaken, completion of the project, process of project implementation and evaluates the performance of the project based on the base line scenario and post project results in terms of bio-physical indicators available from project implementing agencies and project documents.

Chapter VI presents the main findings of the empirical study discussing the socio-economic and institutional indicators like income generating activities, migration, household asset position, percentage share of households below poverty line before and after project implementation, changes in wage rates and income level in real terms, livestock activities, drinking water availability, cropping pattern, changes in agricultural yield, changes in cropping intensity, beneficiary participation in watershed activities, contribution in cash and kind, perceived benefits of watershed treatment, etc., based on the information collected from household survey of beneficiaries and non beneficiaries in two selected villages.

Chapter VII presents conclusions highlighted by lessons drawn, gaps and suggestions for effective implementation of the project and guidelines for future research.

1.8. Limitations of Study

The study does not cover practical measurement of changes in soil fertility and water levels, which are beyond the capacity of the researcher. As the project has already been complete, the baseline survey has not been carried out to capture situation 'before' the implementation of the project. However, we use data available with the project implementing agency 'before' and 'after' to understand and analyse the benefits of SWP in reducing poverty and promoting community development. At the household level, the comparison of 'before' and 'after' scenario is based on the recall capacity of beneficiaries, both farmers and landless and current status of non beneficiaries and the perceptions of all in terms of improvement or changes both positive and negative in selected indicators.

CHAPTER - II

WATERSHED DEVELOPMENT AND EVALUATION A THEMATIC REVIEW

Impact evaluation of watershed development projects has been carried out extensively by many researchers and agencies over the years in different parts of the country. In this chapter we try to summarize the findings from these studies focusing on the concepts, methodology and thrust issues of the studies.

Seventy percent of India's population residing in rural areas is dependent directly on the basic natural resource i.e. land for their livelihood. Economic reforms in India are heading towards transforming Indian agriculture from survival needs to agro-business and agro-industry governed by market forces. This has encouraged monoculture and increased production of cash crops neglecting crop diversity, which is essential for increasing fertility of soil and sustaining human life on earth through food production. Moreover, the reform process in agriculture has not benefited small and marginal farmers due to their size of land holdings and lack of irrigation. Only the large farmers capable of investing on irrigation, mechanization and adopting research developments in bio-technology backed by domestic and export market are benefiting from the liberalization process. Jodha (2001:86) opines that in fragile areas (with high pressure) sustainability in agriculture is not possible through traditional measures. It requires application of modern science and technology blended with the rationale of indigenous practices.

Inspite of the significant progress made in reducing poverty, increase in agricultural production, improving literacy, health standards of people, and infrastructural facilities such as transportation and communication India still faces challenges in meeting the requirements of sustainable development. Our human development indicators are still low as compared to other developing

countries and there are disparities in terms of distribution of the developmental and welfare measures among regions, social groups, gender and classes.

Agriculture plays a crucial role in addressing the needs of a growing population and is linked to poverty eradication. Sustainable agriculture and rural development are essential to the implementation of an integrated approach to increasing food production and enhancing food security and food safety in an environmentally sustainable way. The watershed development programmes introduced in India, particularly in recent times are designed considering the above issues and aim at supporting sustainable livelihoods in rural areas through integrated and community (people) oriented approach.

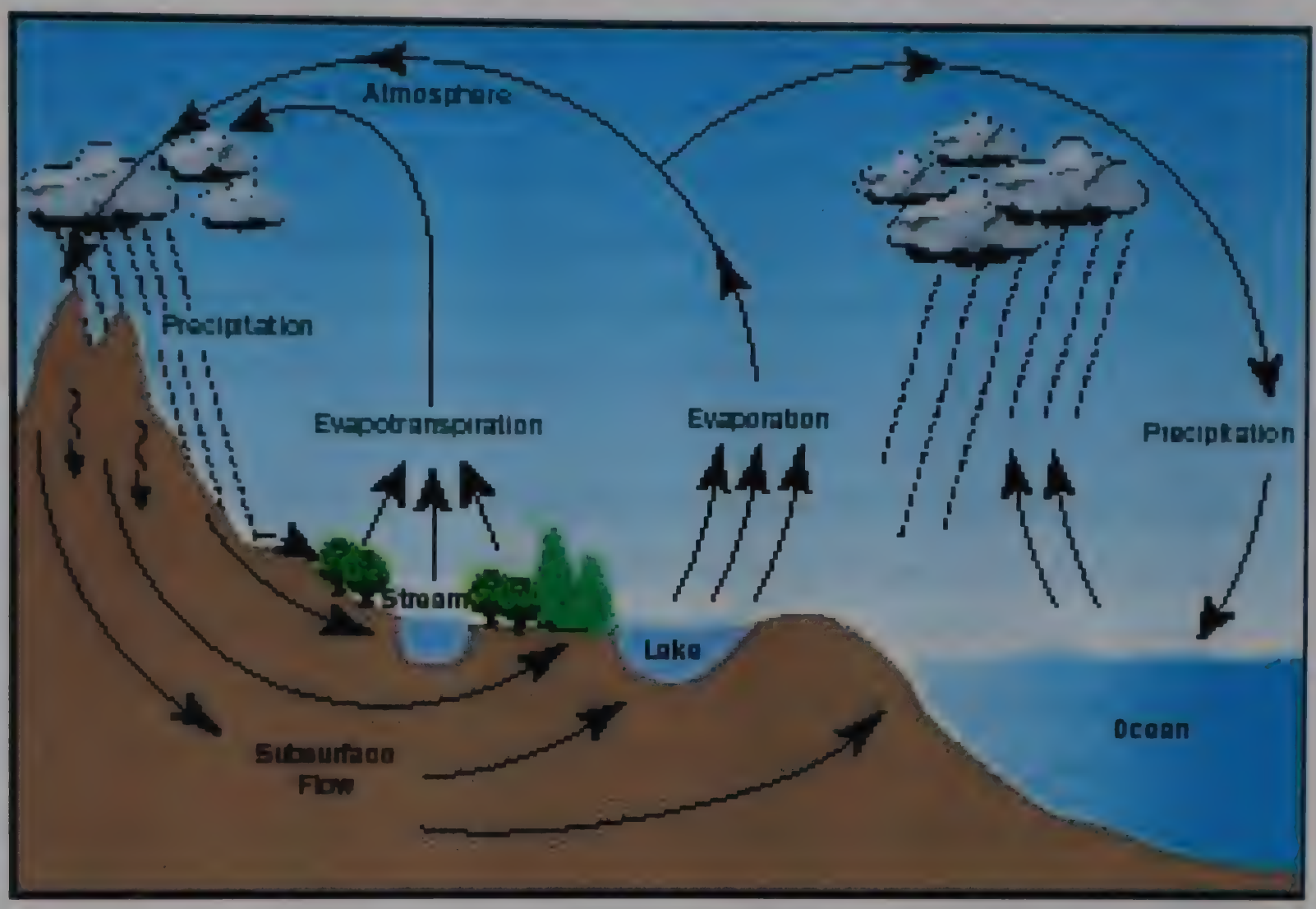
2.1 The concept of Watershed and Watershed management

Watershed is a basic hydrological unit and an important source of drinking water with a topographic boundary and water outlet comprising of soils, landforms and vegetation. It is the area that drains to a common outlet and is the basic building block for land and water planning (Salah et al, 2008). Fresh water use worldwide was about 1,500 km^3 year in 1940 and is projected to be 5,000 $km^{3/}$year in 2000 with increase in the number of water-scarce countries from 7 in 1955 to 20 in 1995 and projected increase of 34 in 2025 (Mishra 2001:1).

A watershed is an area that supplies water by surface or subsurface flow to a given drainage system or body of water, be it a stream, river, wetland, lake, or ocean and, the terms basin, watershed, and catchment are often used interchangeably in the literature (World Bank 2001). Size is not a factor in the definition, and watersheds vary from a few hectares to thousands of square kilometres. Unless a watershed discharges directly into the ocean, it is physically a part of a larger watershed that does, and may be referred to as sub watershed (Black 1991 cited in Salah et al 2008). The watershed is like a large bowl that collects water and delivers it to the watershed outlet, which commonly is a stream or river. For a hydrological cycle within a watershed rainfall is the main

source of water, which then flows through and out of the watershed as surface or groundwater flow incorporated into biomass, or is lost through evaporation and transpiration processes while in the watershed (World Bank 2001). Figure 2.1 presents a picture of hydrological cycle in a watershed.

Fig 2.1 Hydrological Cycle in a Watershed



Source: Adopted from http://www.waterencyclopedia.com/Hy-La/Hydrologic-Cycle.html#ixzz28uHCFK71

Watershed management is the rational utilisation of land and water resources for optimum production with minimum hazards to natural resources. It is essentially related to soil and water conservation in the watershed, which means land use according to land potential, protection of land against all kinds of deterioration, building and maintaining soil fertility, conserving water for farm use, flood protection, proper management of water for drainage, sediment

reduction and increasing productivity from all kinds of land uses (Tideman, 1996 cited in Nicholas, 2006).

From pre-historic times the rain dependent state of Karnataka witnessed continuous efforts by the rulers and people to set up system to harness and collect water. Historical evidence indicated that as early 300 BC, the communities of Karnataka knew the technique of constructing tanks as well as were aware of importance of maintaining them. Inscriptions of Mauryan period provide information on canals, bunds, depth of water and cost of construction [Iyer 2007]. Thousands of inscriptions in the post Mauryan period detail out information on canals, bunds, depth of water, cost of construction and, in Bronze Age and Megalithic Age the people of south India were regarded as leaders in constructing water harvesting systems [Iyer 2007].

Paul (1998) views that the current strategy for rainfed agriculture in India is based on the concept of scientific conservation of rainwater for holistic and integrated development of watersheds and promotion of farming systems approach with a view to evolving models of sustainable agriculture in rainfed areas. A study in Andhra Pradesh showed that installation and administration of small ponds for run off collection and supplementary irrigation as part of an overall village water resource development project (Doherty 1994) was beneficial. Based on this strategy, many centrally sponsored schemes with and without international funding were launched for promoting watersheds viz. Drought Prone Area Development Programme (DPAP), Integrated Wastelands Development Project (IWDP), National Watershed Development Project for Rainfed Areas (NWDPRA), Indo-German Watershed Development Project (IGWDP), Desert Development Programme (DDP), Employment Assurance Scheme (EAS), etc.

Watershed management is the integrated use of land, vegetation and water in a geographically discrete drainage area for the benefit of its residents, with the

objective of protecting or conserving the hydrologic services that the watershed provides and of reducing or avoiding negative downstream or groundwater impacts (Salah et. al 2008). Earlier watershed projects focused on improvement in physical indicators and were more or less set patterns of the implementing Ministry guided by fixed targets. The projects were designed at the national level and beneficiary participation in management and, contribution even for the development of the private land was not mandatory. While the earlier programmes initiated by the government departments were on-site engineering programmes focusing on physical outcomes, the current programmes largely funded by external agencies try to develop demand driven, community oriented/ participated and local specific programmes. The tank rejuvenation project taken up with external funding is one of the programmes initiated to enhance community participation for water resource management. The changeover of administration and management of tanks from people's institutions to government was a major reason for the decline of the tank system in India. Therefore rehabilitation of tanks was taken up on a major scale by creating 'Tank Users' Associations' with external funding for maintenance and management of the tank under some of the watershed development programmes.

2.2 Watershed Development Programmes in India: A brief introduction

Watershed development emerged out of the need to develop upper watershed and drought prone areas, which received less rainfall and less attention under irrigation oriented schemes that were taken up on a large scale under Five Year Plans to give a boost to Indian agriculture. Three ministries at the Centre namely, the Ministry of Agriculture (MoA), Ministry of Rural Development (MoRD) and Ministry of Environment and Forest (MoEF) along with some respective departments in the States are involved in policy formulation and implementation of watershed development programmes. Ministry of Agriculture started this programme way back in 1960s. The recommendations of the Technical Committee under the Chairmanship of Prof. C.H. Hanumantha Rao constituted in 1994 brought the DDP, the DPAP and the Integrated Wastelands

Development Programme (IWDP) under a single framework of guidelines and the watershed projects taken up by the Ministry of Rural Development (MoRD) from 1994 to 2001 followed these guidelines. In 2000, the Ministry of Agriculture revised its guidelines for its programme, the National Watershed Development Project for Rainfed Areas (NWDPRA). The MoRD revised the 1994 Hanumantha Rao Committee guidelines in 2001 and yet again in 2003 under the nomenclature "Hariyali Guidelines" (Chandrudu, 2010). From 2008 onwards, watershed development programmes are being implemented on the new guidelines framed by the National Rainfed Area Authority (NRAA) established by Central government in 2006 to focus on improving the development of the rainfed areas of the country. The Authority addresses to sustainable and holistic development of rainfed areas, including appropriate farming and livelihood system approaches.

A brief introduction to some of the major programmes initiated **(based on departmental reports and official websites of the Ministries)** by Government of India from 1960 to date has been presented here:

2.2.1 Drought Prone Area Development Programme (DPAP):

DPAP was initiated in 1973 as a result of severe drought experienced by the country during 1960s to develop those fragile areas severely affected by drought and was carried forward during Fifth Five Year Plan (1974-79) with the objectives to achieve optimum utilization of natural resources and the integrated development of the area. The basic objective of the programme is to minimise the adverse effects of drought on production of crops and livestock, productivity of land, water and human resources ultimately leading to drought proofing of the affected areas. DPAP was programmed for non-arable lands and drainage lines for in situ soil and moisture conservation, agro-forestry, pasture development, horticulture and alternate land uses. The project received Central and State Government funding in the ratio of 75:25. The focus was on capacity building and empowerment of village community through participation of Panchayati Raj

institutions in programme implementation, transfer of funds and decision making power to the local people.

2.2.2 Integrated Wastelands Development Project (IWDP):

The programme was implemented in 1989 and was extended to areas not covered by DPAP and DDP. The IWDP is a 100% centrally sponsored scheme. The objective of the programme is to arrest rainwater run-off and conserve it in situ where it falls. Planting and sowing of multipurpose trees, natural regeneration of biomass, wood substitution and fuel wood conservation measures, soil and moisture conservation measures are some of the activities taken up under the programme. IWDP adopted pasture development, soil and moisture conservation as prominent activities on wasteland under government, community or private control. The common theme was sustainable management of land and water resources. The watershed activities under the Integrated Wasteland Development Programme were expected to result in improved productivity of wastelands, improved availability of fuel wood and fodder, increased water availability, reduction in migration from rural areas and overall improvement in the economic status of the rural people.

2.2.3 National Watershed Development Project for Rainfed Areas (NWDPRA):

The programme initiated in 1990-91 in 25 States intended to generate successful models for integrated development in all the community development blocks of the country where less than 30 percent of arable area was under assured irrigation. Thrust is on integrated watershed management and sustainable farming systems. The scheme of NWDPRA has been subsumed under the Scheme for Macro Management of Agriculture (MMA) from 2000-2001. While the North Eastern States received 100% grant, for other States the ratio is 90:10 respectively for central and state government. Impact evaluation studies both on the ground and through remote sensing techniques have shown that watershed based interventions have led to: increase in groundwater recharge, increase in

number of wells and water bodies, enhancement of cropping intensity, changes in cropping pattern and higher yields of crops and reduction in soil losses.

2.2.4 Desert Development Programme (DDP):

The programme was initially implemented in Gujarat, Rajasthan, Haryana, Jammu & Kashmir in 1977-78, and later extended to Andhra Pradesh and Karnataka. The programme is taken up in areas with continuous depletion of vegetative cover, increasing wind erosion and decline in ground water level resulting in reduced productivity and loss of natural resources. The basic objective of the programme is to minimise the adverse effect of drought and control desertification through rejuvenation of natural resource base of the identified desert areas. The programme strives to achieve ecological balance in the long run. The programme also aims at promoting overall economic development and improving the socio-economic conditions of the resource poor and disadvantaged sections inhabiting the programme areas. DDP focused on reforestation to arrest the growth of hot and cold deserts.

2.2.5 Employment Assurance Scheme (EAS):

The scheme was introduced 1993 covering 261 districts in the drought prone areas, desert areas, tribal areas and hill areas of the country. The objective was to provide 100 days of gainful employment to adults not finding work in lean agricultural season but, having desire to work under the programme. Horticulture development was a component under the programme. 50% of the funds were permitted to be utilized for watershed development only in DPAP and DDP areas.

2.2.6 Integrated Watershed Management Programme (IWMP):

The 1994 guidelines for watershed development programmes were revised by the Planning Commission and National Rainfed Area Authority (NRAA) as Common Guidelines, 2008 for watershed programmes for all Ministries/Departments based on the Parthasarathy Committee Report and past

experiences. Thereafter, Drought Prone Areas Programme (DPAP), Desert Development Programme (DDP) and Integrated Wastelands Development Programme (IWDP) were integrated and consolidated into a single modified programme called Integrated Watershed Management Programme (IWMP). The scheme has been implemented since 2009. The programme includes soil and moisture conservation measures like terracing, bunding, trenching, vegetative barriers, rain water harvesting activities like farm ponds, percolation tanks, check dams, planting and sowing of multi-purpose trees, shrubs, grasses, legumes and pasture land development encouraging natural regeneration, promotion of agro-forestry and horticulture training, extension and creation of awareness, peoples' participation, livelihood activities for asset less people, production system and micro-enterprise. IWMP aims to develop cluster of micro-watersheds for area covering 1000 ha to 5000 ha at an approximate cost of Rs. 12,000 for plains and Rs.15,000 for difficult and hilly areas.

2.2.7 Mahatma Gandhi Rural Employment Guarantee Scheme (MNREGA):

Under MNREGA, activities required for watershed development are taken up on a large scale to provide minimum days of employment to rural poor to sustain household income and subsistence living. The programme initiated in 2005 aims to provide livelihood security to people in rural areas by guaranteeing hundred days of wage-employment in a financial year to a rural household whose members volunteer to do unskilled manual work. The programmes taken up include water conservation and water harvesting; afforestation and tree plantation; irrigation canals, including micro and minor irrigation works; plantation, horticulture, land development renovation of traditional water bodies, including de-silting of tanks; land development works like bench terracing, contour bunding, pasture development; flood-control and protection works, including drainage in waterlogged areas; all-weather connectivity roads, etc. "Despite its best intentions, MGNREGA is beset with controversy about corrupt officials, deficit financing as the source of funds, poor quality of infrastructure built under this program, and unintended destructive effect on poverty" (Bassi

and Kumar 2010); Datar Chhaya (2007); The Economist, 2011; Wright and Harsha, 2011, etc.).

2.2.8 Karnataka Watershed Development Project (KAWAD):

The project was initiated during 1998-2001 in Upparahalla of Bellary, Doddahalla of Bijapur and Chinnahagari of Chitradurga districts covering a population of 1,00,000 and total area of 45,000 hectares. Institution building, linking farm and non-farm activities, provision of credit, promoting village level institutions, participation of beneficiaries both in physical and financial programmes all aiming at income and employment generating activities were unique features of KAWAD. Improving the livelihood of the people through institutional approach was the priority of the project. The entire process of implementation was guided and supervised by a team with expertise in water resource management, farming systems development and community development, which also provided technical support to NGOs, implementing agencies and KAWAD staff in implementation of the project. The watersheds selected for KAWAD fall in northern Karnataka, which receives less rainfall and has larger area prone to frequent drought. The impact evaluation studies (Batchelor *et al.* 2000; Deshpande et al. 2003; Biradar, 2008) indicate that the project has improved the living standards of the people by promoting self employment opportunities and capacity of the community through training and networking while, poor management of soil moisture and afforestation programmes and lack of effort to sustain investments made on common lands has also been pointed out by similar studies (Silori *et al.*, 2008).

2.2.9 Sujala Watershed Development Project:

The project was introduced in three phases starting from 2001 and ended in March 2009. Improving the productive potential of selected watersheds and natural resources, community participation and management of natural resources through institutional arrangement were the key components of this project. The project is known locally as "Sujala" watershed development project. The details

of implementation of Sujala Watershed Development Project and other watersheds in Karnataka are discussed in detail in Chapter 3.

2.3 Evaluation of Watershed Development Programmes: Methods and Approach

Evaluation is a systematic and objective assessment of the design, implementation and results of an ongoing or completed project, programme, or policy (OECD, 1991) in order to assess its relevance, efficiency, effectiveness, impact and sustainability (OECD 1991 cited in Bruin 2010:2). Most of the studies on watershed impact evaluation have concentrated on physical and economic indicators viz. changes in ground water table, vegetation cover, bio diversity, soil moisture, crop yield, etc., while the changes in availability of water downstream, hydrology, land use pattern have received less attention. Different ways adopted by researchers for collecting information on impact assessment of watershed include baseline and household surveys, participatory appraisal techniques, focused group discussions, longitudinal studies, physical verifications, documentation of processes, application of Geographical Information System (GIS), etc. Considering the merits of each of these approaches, many have attempted to use combination of different assessment methods.

Here we discuss different approaches or methodologies to impact evaluation of watershed treatment as reviewed from available studies:

1) **Before and After Approach:** The micro level situation here is analysed before the project and at times during and/or after the project. In this approach baseline data on specific indicators on prospective beneficiaries is taken before watershed treatment and information on the same indicators is sought after implementation of the project and compared with the baseline scenario.

However, collecting authentic information from prospective beneficiaries becomes difficult if it is not clear which households will become beneficiaries and who could be part of a control group. Many a times watershed programmes are optional to the villagers. Only those who are interested and willing and who contribute either in terms of cash or kind and whose land is amenable to watershed treatment become part of the programme. In such cases information may be collected from randomly selected households in micro watershed area before the treatment.

2) Given the data on potential beneficiaries in a watershed development project and a random sample drawn from a comparable watershed with similar social, infrastructure, agro-climatic and economic characteristics, participants in the treatment watershed are matched with non participants in the non treatment watershed (Hope 2007) before and after implementation of the project. This method of collecting similar data from non participants before and after project implementation helps to study 'double difference' estimates of project impacts.

3) **With and Without Approach:** This approach involves comparison of data on selected indicators collected for beneficiaries/ households in treated area with similar data on non beneficiaries/households in non treated area.

4) Recording what has changed compared to what was planned to change (De Bruin 2010) i.e. target vs. achievements, which could be in terms of soil conservation, increase in ground water level, increase in vegetation cover, increase in employment generation, etc., at the project level and collecting information on diversification of crops, livestock rearing, crop yield, crop intensity, economic returns at the household level. De Bruin (2010) suggests that a proper methodology on evaluation of watershed development should consider importance of farmer participation, pre/post assessments and evaluation, compare beneficiary results with independent

control groups or non beneficiaries, conduct evaluation as a process and, look at the logical/results or indicators more as management tools or guidelines than as blueprints.

5) Economic Surplus Approach (ES): Palanisami *et al.* (2009) used economic Surplus approach to evaluate impact of watershed treatment using the data from a cluster of 10 watersheds in the Coimbatore district of Tamil Nadu. According to this model consumers who are mainly the non-farm households i.e. labourers, businessmen and people engaged in non -farm activities gain as they consume more at lower prices and producers i.e. farm households gain by producing profitable crops and goods using the benefits of watershed at lower costs. The economic surplus approach captures the total benefits accrued due to watershed development intervention in the rural areas. In this, watershed treatment benefitting both private and public land is considered as 'public good'. The benefits to producers and consumers are estimated considering the cost of watershed development, investment during the project period and maintenance expenditure incurred in the project. Total benefits include incremental benefits from each technology and crop. Applying 10% discount rate to the watershed development projects, the net present value (NPV), benefit-cost ratio (BCR), and internal rate of return (IRR) are computed (Palanisami *et al.* 2009).

6) **Quantitative versus Qualitative data:** Integrating qualitative and quantitative approaches in monitoring and evaluating poverty impacts has proven very effective. Quantitative analysis results in more generalizable results, but qualitative and participatory methods allow in-depth study of selected issues, cases, or events, and can provide critical insights into beneficiaries' perspectives. Qualitative analysis throws light on the changes due to a particular reform, or the reasons behind results observed in a quantitative analysis. A special attempt can be made to monitor the satisfaction of the poor with the project through focus group or other qualitative methods (World Bank 2006). Shah et al (2004) emphasize the

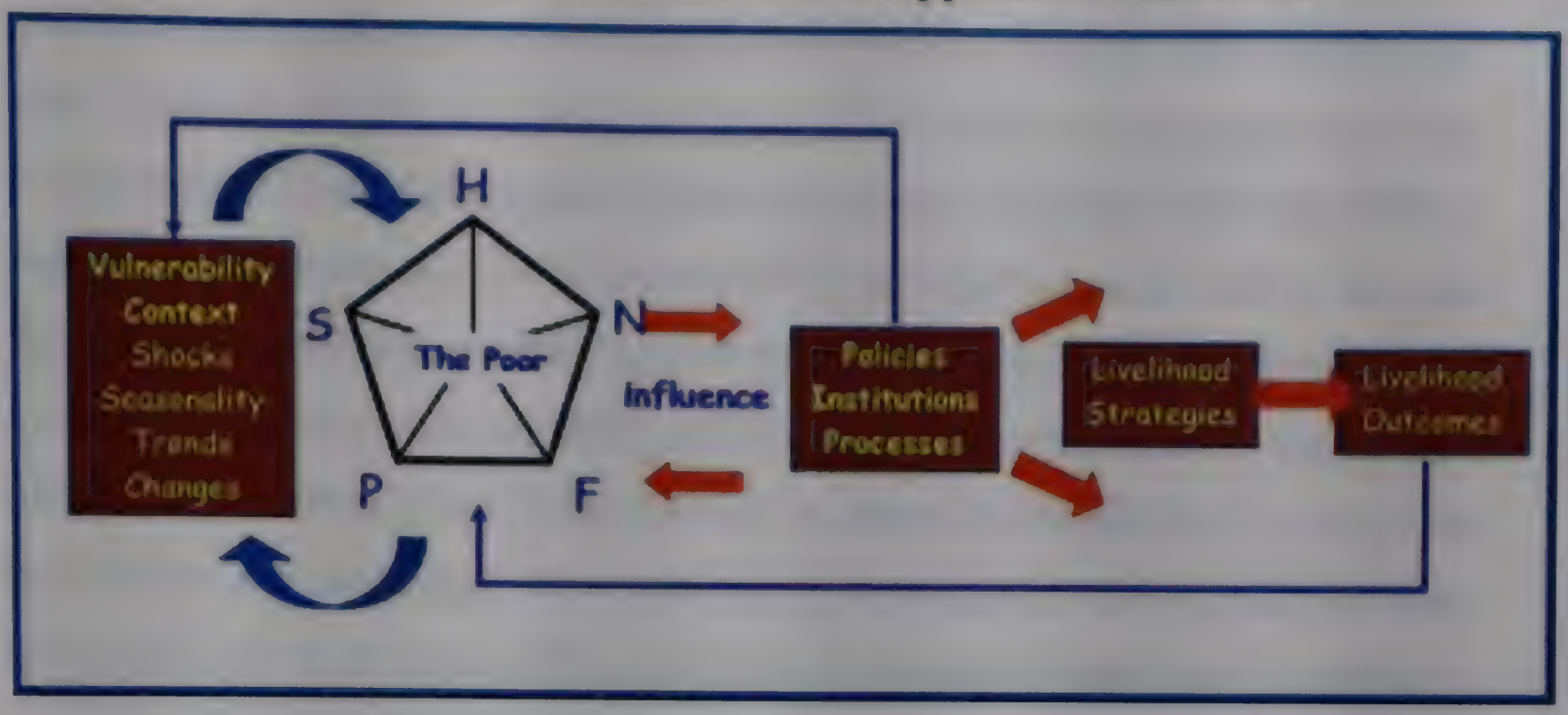
importance of time series data on crop productivity in assessing the impact of watershed projects. Qualitative analysis includes discussions, observation, inspection, resource mapping and impact mapping to understand the community/ farmers perception about the quality and impact of works executed in the watershed.

7) **Livelihood approach to watershed development:** The current approach to watershed development in India incorporates livelihood approach aiming at productivity enhancement and livelihoods. People and their development receive priority along with conservation measures. Livestock and fisheries management are encouraged with support of dairying and marketing facility as they are expected to contribute towards sustainable livelihood for the poor.

DFID approach to sustainable livelihood: "The guiding assumption of the DFID approach is that people pursue a range of livelihood outcomes by which they hope to improve or increase their livelihood assets and to reduce their vulnerability. The five types of assets that form the core of livelihood resources in the DFID SL framework range from financial, human, natural, physical, to social capital. Poverty-focused development activities should be people-centred, flexible, responsive and participatory. They should be conceived as multi-level approaches and be conducted in partnership with both the public and private sectors"(www.poverty-wellbeing.net/media/sla/docs/2-1.htm).

The Sustainable Livelihood Approach (SLA) Framework presented below (as adopted from www.ifad.org) shows the main components of SLA and how they are linked.

Fig. 2.2. The Sustainable Livelihood Approach Framework



Source: www.ifad.org/sla/index.htm

The livelihood approach discussed above is people-centred (people rather than the resources they use are the priority concern), holistic (understanding the stakeholder's livelihoods as a whole, with all its facets), dynamic (learn from changes to mitigating negative impacts and support positive effects), builds on strengths (recognition of stakeholders' potentials), try to attain macro-micro links (bridge this gap in between the two levels) and sustainability of the intervention (able to face external shocks and stresses, sustain without external support and sustain long-term productivity of natural resources) (culled out from www.ifad.org).

2.4 Review of Studies

The guidelines of the Ministry of Agriculture for evaluating the impact of watershed projects (GOI, 1994) generally included `before-after' comparison taking into account the normal year and stress period to delink the benefits from the fluctuations in rainfall. Shah et al (2004) describe the evaluation approach adopted by the Ministry of Rural Areas and Employment to assess the outcome of Integrated Watershed Development Projects (IWDP) for the period 1995-2000 in 330 districts to be limited to one point of time, carried out without benchmark survey and without thorough physical verification. The study was carried out on

perception based question such as: whether the project had a positive impact on control of soil erosion, arrest of run-off water, improvement in soil-moisture etc., with answers sought as `yes' or `no'. They further commented that the "assessment of household income from various sources is an extremely difficult and time-consuming task to be accomplished in a quick survey such as this and the estimates need to be verified against certain important indicators like changes in asset base, consumption pattern, and human resources etc., and in the absence of such information it would be difficult to ascertain changes in income of the households and attributing these changes to watershed projects might be even more difficult" Shah et al (2004:14). Lack of adequate baseline and monitoring data in the projects is also a major limitation to the study (World Bank 2006).

Indo-German Watershed Project identified nine major parameters for assessing the impact of the project viz. soil loss, ground water level, height for age of the children, school attendance and enrolment rates, ownership of select consumer durables, social capital, use and maintenance, outsiders (dependence on) and replication (Shah *et al.* 2004). In order to have an integrated approach to impact assessment of watershed management most researchers have combined bio-physical and socio-economic indicators.

Turton (2000) emphasizes sustainable livelihoods approach to assess the impact of watershed projects in India. The key issues that are addressed include viz. which assets are most important to the poor? Has access by the poor to common property improved as a result of WSD? Does WSD support the livelihood strategies of the poor? How do people's livelihood strategies affect their participation in and benefit from WSD? What contribution has WSD made to sustainable livelihoods? What are the relevant outcome indicators? Are people's own livelihood priorities being addressed? How can activities be adapted in order to enhance livelihood impacts on target groups? To show how marginalized are distanced further, Turton (2000) gives a best example of migration in a watershed project wherein the migrants who are also the poorest

being often absent from villages tend to be marginalised from decisions on resource use. Although NGOs strive hard to achieve diversification through alternate livelihood activities, according to Turton (2000), the activities like artisanal products generally face inelastic demand, therefore the scope for any increased contribution to livelihoods is likely to be limited.

In both 'before' and 'after' and, 'with' and 'without' approach there is a general implicit assumption that there are no major changes in terms of climatic conditions, technological developments, social or cultural factors, which sometimes are likely to alter the scenario. But, in real life situations there could be some invisible or unquantifiable events that may affect or influence several indicators of watershed development.

Cost benefit analysis is one of the ways used for evaluating watershed development programmes. In addition to economic benefits, social and environmental costs and their benefits need to be considered for proper judgment of the benefits from watershed programmes. Rao *et al.* (2003) have developed an Index by assigning weightage to each of the parameter integrating, economic, social and environmental factors by assigning watershed development units before and after development activities. The performance index i.e. the impact of developmental activities in a watershed is calculated in terms of watershed development units. They have used remote sensing data and information on cropping intensity, socio –economic conditions, food, fodder, fuel wood status, forest density, wasteland, cropping intensity, water body, basic needs status such as drinking water condition, demand and supply status for pulses, cereals, fodder, fuel wood, etc. The importance of parameters in the watershed was expressed in terms of units by quantifying several individual subjective value judgments. While the absolute values indicate overall development the differences in watershed development units indicate the impact of particular programme carried out in watershed. Monitoring of Livelihoods (MoL) a participatory monitoring tool developed by Catalyst Management Services for

KAWAD was used by (Deshpande *et al.* 2003) in evaluating the impact of watershed development programme in drought-prone areas of three districts, viz., Chitradurga, Bellary and Bijapur. This is a tool for assessing livelihood of the stakeholders using a sustainable rural livelihood framework indicating five aspects of the rural livelihood system viz. physical capital, social capital, financial capital, human capital and, natural capital. Mishra (2008) argue that in addition to economic and environmental indicators it is essential to analyse the impact of watershed by including parameters such as organizational processes, stakeholders' interests, participation, etc. Using the case study method and by observing the process of implementation of the project in two areas, Mishra (2008) carried out social cost-benefit analysis by including decisions, events, interactions and conflicts.

Lele *et al.* (2009) carried out an appraisal of watershed development sustainability across a number of micro-watersheds in Karnataka that have been treated under different programmes at different points in time, ranging from 1 year to 16 years post completion. They adopted a 'rapid appraisal' strategy in which data on a small set of key variables were gathered through group discussions and field verifications without benefit cost evaluation and analysis of cost-effectiveness of different programmes. The focus of the study was on understanding the pattern of current status and perceived impact across a large region, and across different watershed programmes.

Reddy et al. (2004) conducted evaluation of watershed development programmes in India through surveys of 37 watershed locations implemented by different agencies viz. National Watershed Development Programme for Rainfed Areas (NWDPRA), Ministry of Rural Development (MoRD), ICAR Institutions, International Agency (IA) funded watersheds and Non-Governmental Organization managed watersheds in different agro-eco regions during 2001. Data were collected from primary stakeholders pertaining to physical (ground water, soil erosion, runoff reduction, etc.), biological (afforestation, cropping

intensity, productivity levels of dryland crops) and socio-economic parameters (additional benefit-cost ratio, additional annuity value, etc. and additional employment and reduction in outmigration of labour, participation of farmers in watershed programmes) in watershed programme areas compared to non-watershed areas. Standard survey techniques were employed on the basis of 'Before' and 'After'/ 'Now' in case of bio-physical factors and 'with' and 'without' procedure through group discussion with farmers and project implementing agencies (PIAs) at each location i.e. in case of socio-economic factors, 'with' (watershed villages) and 'without' (non-watershed villages) procedure was followed.

Impact assessment of watershed programs in Uttar Pradesh (Rao, 2010) was carried through Rapid Reconnaissance (investigation) Survey to assess the impacts of watershed development project by community members themselves. It is a "self assessment" of watershed development projects by communities. For facilitating this, four sets of "impact indicators" were identified and were classified into – physical; bio physical; economic and social components. The study covered 100 watersheds in 16 districts representing watersheds implemented under different programs like IWDP and DPAP, in different periods and also by different agencies-both government and civil societies. As part of rapid reconnaissance survey, a focus group discussion (FGD) with farmers, women and labourers was conducted in each of the watershed villages. During the FGD, participants were asked to share their perception about the impact of watershed program. During this discussion, the villagers were encouraged to give scores to each impact indicator. The response/ score given by the community reflect changes that have taken place about a particular indicator after completion of watershed program. The scores which represent the responses of the community for each indicator under a particular component (say physical factors) were finally added at component level to give a picture of perceived impact under that component.

The above study aimed at assessing impacts of investments made to implement watershed development programs on water, land, plantation, livestock and livelihood promotion of the beneficiaries in watershed village. The study identified 34 indicators and each of these indicators was assigned different score with total score being 100 points for all indicators under four categories of factors. While reduction in soil erosion, enhanced yields in cereals, pulses was commonly accepted impact by small and large farmers, there were mixed responses on the impact of the project on yield of oil seeds with very few finding the difference and almost zero impact on cotton and cropping intensity. On the other hand the performance of watersheds assessed based on four parameters viz. runoff reduction, assured drinking water supply, increase in irrigated area and status of water harvesting structures scored high as the impact was felt by the beneficiaries. The other main benefit perceived by the respondents was the increase in additional employment days for men and women in agriculture and non agriculture activities. In addition the project resulted in crop diversification. There was increase in area under fruits, vegetables and other horticulture crops.

International Food Policy Research Institute (IFPRI) has attempted to evaluate watershed development projects in India to find out, which watershed projects were most successful in raising agricultural productivity, improving natural resources management, and reducing poverty, what approaches enabled projects to succeed, what non-project factors contributed to achieving these objectives, etc. (World Bank 2006). We discuss here the summary of the findings culled out from the above report. The study covered projects funded by international agencies and state governments and is based mainly quantitative analysis. The data was supported by information sought from focused groups including farmers with, and without, irrigation, landless people, shepherds, and women. The period for analysis was 10 years covering 86 villages in Maharashtra and Andhra Pradesh. Baseline survey data was obtained from project sponsoring and implementing agencies. The impact of watershed projects on household welfare were measured through perceived effects of the project on

the household, perceived changes in living standards, changes in housing quality, change in percentage of families migrating, perceived changes in real wage, and the availability of casual employment opportunities as expressed by the beneficiaries.

IFPRI study found that community participation was a contributing factor for the better performance of the projects rather than those dictated from the above. It was found that equity issues were not addressed properly and large farmers received higher benefits as against not so favourable or negative effects for the landless and near-landless people. This is given by an example say while 45 percent of households with 2 or more hectares claimed they had benefited from watershed projects, only 12 percent of the landless and 19 percent of farmers with less than 1 hectare claimed to have benefited. The projects run by nongovernmental organizations (NGOs) were associated with higher net returns (World Bank 2006).

Midterm impact assessment of Uttarkhand Decentralised Watershed Development Project (UDWDP) was carried out by TERI in 40 villages representing 40 gram panchayats and 10 households in each village with a control group of 30 villages covering 300 households. The study followed 'with' and 'without' approach to assess the impact of the watershed project. The study revealed that the project yielded positive outcomes in terms of enhanced incomes (by 12% in real terms), increase in productivity and irrigated area (by 10%), increase in improved breeds of cow and buffalo (by 7% and 67% respectively), increase in number of SHGs by three times, relatively larger gains for the vulnerable groups, their representation in decision making, etc. In comparison, the control group experienced only 7% increase in income and 3% increase in irrigated area. There was reduction in availability of fodder by 3% as against increase in availability of fodder in 50% of project villages. There was also some reduction in the number of cow and buffalo owned by beneficiaries.

The approach of combining the technical competence of the State with NGOs for promoting the participation of the target population ensures success (Deshpande et al 2003) and better utilization of external funding in watershed management. The rural livelihood project implemented in drought-prone areas of three districts, viz., Chitradurga, Bellary and Bijapur by KAWAD following the above approach was evaluated by Deshpande et al (2003). The tool encompasses five assets/capitals covering the major livelihood functions. These include (i) Physical Capital, (ii) Social Capital, (iii) Financial Capital, (iv) Human Capital, and (v) Natural Capital. All these indicate five aspects of the rural livelihood system. The study covered almost 10% of the watershed beneficiaries (1,170). The beneficiaries had good awareness about technical details of the project. Women and Scheduled Castes and Scheduled Tribes had benefited significantly and participation in institutional membership was quite noteworthy. The study noticed that the issues of equity, efficiency, empowerment to the rural poor and supplementary economic activities were well addressed in project implementation.

2.5 Selection of Indicators

Indicators are used as tools for analyzing the impact of the project and therefore should be identified considering objectives of the project, activities undertaken, time and resource constraints, possibilities of getting relevant information, etc. In addition to technical benefits, they must be able to capture social, economic and environmental benefits.

The indicators for impact evaluation of watershed programmes used by researchers at different points of time at different locations can be grouped under following major categories as shown in Table 2.1:

Table 2.1 Indicators for Impact Assessment of Watershed Programmes

Sl. No.	Indicator	Details
A.	Physical Indicators	i) Soil conservation ii) Ground water level iii) Run-off reduction iv)Water harvesting structures
B.	Biological Indicators	i) Vegetation cover ii) Soil –nutrients and salinity iii) Availability of fodder
C.	Socio-economic indicators	i) Educational status ii) Irrigation iii) Crop yield and cropping pattern iv) Crop intensity v) Household and agricultural asset position vi) Income level/Share of HHs below poverty line vii) Employment status viii) Migration ix) Fisheries and livestock production x) Wage rates xi)Adoption of practices and techniques xii) Income generating activities
D.	Institutional Indicators	i)Awareness about the programme and its components ii) Formation of SHGs iii)Participation in watershed development committees iv) Contribution in terms of cash and kind v) Participation in Training programmes

2.6 Watershed Development: Community Management and Collective Approach

Many NGOs like BAIF, MYRADA, Relegan Siddi, Pani Panchayat have adopted watershed approach in various parts of the country and demonstrated that community based watershed approach would not only mitigate negative impacts of drought, but also strengthen village economy (Chandrudu, 2010). Watershed development works should be planned, designed and executed on the basis of ground realities. Stakeholders play an important role in the implementation and success of the watershed programmes a fact that has been neglected by many researchers in evaluating watershed programmes (Mishra 2008). Involvement of Community/user groups in water resource management, distribution, utilization and in sharing financial burden in terms of both cash and kind is becoming necessary in the era of scarcity privatization and globalization. This is a major component incorporated in terms of references and in the agenda of sponsored programmes focusing on water supply and water resource management and development, particularly in externally assisted projects. This is expected to increase accountability, competition and efficiency in water use. In Karnataka Jal SamvardhanaYojana Sangha (JSYS) has been set up for implementing the task of rejuvenation of tanks and initiating peoples' participation. Community contribution for rejuvenation of tanks is sought to the extent of 15%. Khanaka K and Bhayan Anjana (2006), show that the approach to watershed management is participatory in nature, it is people friendly, location specific, process based and geared to cater to the problem and need of the local/rural communities.

Over the years there have been changes in the designing of watershed projects from implementing technically designed exogenous programmme to community oriented and participated endogenous projects. However, Kerr and Kimberley (2001) find that there is still a need for the new projects to draw upon lessons from the experiences of completed projects. Community participation through involvement in planning, contribution in cash and kind, maintenance and

monitoring appears to be the components of project design rather than actual implementation.

Sukhomajri experiment a government program initiated in 1981 by the efforts of the community by forming Water User Society (WUS) recorded a great success and turned out to be a model in watershed management. Chopra et al (1990) have studied the functioning of this model of collective action in watershed management. Under this experiment led by Shri. P.R. Mishra, the common property resources were transferred to village society and the WUS managed and distributed water on equal rights with active participation of beneficiaries. Sukhomajri is a Gujjar village in the Shiwalik Hills. Soil erosion, forest denudation and rise in poverty continued unabated in this region till the emergence of 'Sukhomajri model' in 1981. The term "Sukhomajri model' indicates peoples' participation in the management of common property resources in the region with the objective of preservation and self-sustaining development. Dams for water storage and irrigation were constructed. Equal rights and equal shares of water were given to each household with the option to sell the surplus. Collective decisions were taken to ban open grazing, to do stall-feeding, to improve cropping patterns and livestock breeds, to cooperate in protection of forestlands and to obtain exclusive fodder collection contracts from the forestlands. Chopra et *al.* (1990) report that this community-based management has regenerated the degraded hills, and has made the village self-sufficient in food grains, milk and fodder. The study finds that establishing effective 'non-governmental, non-market institution' is the real solution to the tragedy of commons. It is found that the degree of success depends upon the distribution of private asset, social structure, existence of catalysts, such as committed leadership and support from government and other agencies, and employment and income situation.

It has been realized that major difficulties to people's involvement in watershed development programmes are managerial and technical skills in

community mobilization, conflict resolution and institution building (Gawande 2001). Raina (2004:93-96) based on the study of Doon valley project (Uttranchal) suggested that the watershed developmental projects should aim at the promotion of watershed development as a viable means of people oriented sustainable development. The mountain areas have specific developmental challenges due to complexity of rural livelihoods and supporting biophysical resources depicted through the adoption of specific farming systems. The human adaptation mechanism to these complexities is so interwoven that it is not possible to address ecological threats without touching the farming based rural livelihoods. Therefore, on farm watershed development should be adopted as one of the strategic issue. The conventional watershed development approach should deviate towards community watershed whereby immediate food and livelihood needs are satisfied first.

2.7 Watershed Development Programmes and Socio-Economic Benefits

Positive outcome

Equity and decentralization are other two important objectives of watershed projects in India, therefore the expected benefits are multidimensional and vary across time and scale (Shah *et al.* 2004). The impact of watershed development relates to the long-term changes in physical and socio-economic variables of relevance, while the sustainability of watershed programmes would be defined in terms of the longevity of interventions and needs to be based on an understanding of what the programmes were attempting to achieve and how (Lele *et al.* 2009). Ramesh (1999) specifies that the Watershed Development Programme (WDP) is not by itself a panacea for many socio-economic problems encountered by the farmers particularly in dry land regions. The activities of the WDP are aimed at increasing or stabilizing the carrying capacity of the natural resources. The official report of World Bank by Milne Grant (2007) states of an increase in farm yields, livestock rearing, flow of micro finance and co-management of common lands in watershed area due to implementation of Sujala

project. Rajput and Patidar (2003), reveal that the benefits of watershed projects in terms of average crop production, net income and family labor income were higher in all farmers groups in Rajiv Gandhi Watershed Technology area compared to non treated area. A study on impact evaluation of watershed development programme in western Madhya Pradesh by Rajput *et al.* (1994) revealed average net returns per hectare to be higher by 145% in WDP area and benefit cost ratio to be 1.97 in the WDP area while it was 1.48 in the non-WDP area. Similarly, productivity levels were also higher in WDP area over non-WDP area. The WDP played a significant role in accelerating agricultural production and bringing about change in the cropping pattern in favour of remunerative crops.

The World Bank study (Salah *et al.* 2008) reports that although profitability is a key for engaging stakeholders in conservation, watershed management interventions may not in themselves be profitable for stakeholders. Establishing accurate estimates of costs and benefits, both at the farm level and beyond, has proved difficult. This is because often technical choices have been made without due consideration of financial profitability or of economic value to society. The report specifies that inspite of little best practice to go on, it is possible to draw up a pragmatic methodology for analysis of costs and benefits of different investments at the farm level, which could serve in future operations as a building block for designing investment packages and setting the incentive structure. Stakeholders who have a "need to know" are people living in the project area who are affected by the project, managers who need information for implementation, and promoters (government and external financiers) interested in results.

A study by Rao *et al.* (2003) on government watershed programmes in some parts of Maharashtra and Madhya Pradesh carried out using performance index including socio-economic and climatic parameters showed that the economic returns were 10 folds in marginal land, 4 folds in moderately developed lands and more than 2 folds in developed lands. Munikishore *et al.*

(2008) developed a scale to measure attitude of beneficiaries towards SWP. Their study was conducted on a sample of 120 farmers in four purposively chosen villages of Dharwad and Kalaghtagi taluks of Dharwad district covered under first phase. The villages chosen had maximum area and maximum number of respondents. A structured attitude scale consisting of 14 indicators was used on five point scale to record the responses of the beneficiaries. Based on the attitude of beneficiaries the study found that SWP had provided several benefits like construction of physical interventions, training in crop production and protection, technical guidance, supply of seedlings, improved implements, etc. The staff of the SWP demonstrated soil and moisture conservation measures. Overall around 50% of the beneficiaries had favourable attitude towards SWP.

A study by Indian Council of Agricultural Research (ICAR) on Sidibo watershed in the State of Arunachal Pradesh treated under NWDPRA during IXth Five Year Plan indicates project interventions to have increased cropped area by 14% and the cropping intensity by 22%. However, the project failed to generate local participation, women's involvement, coordination between line departments and NGO participation. In a study by Parizenganeh *et al*. (2008) on evaluation of the socio-economic and environmental impacts of the Zanjan river restoration project in Iran both quantitative and qualitative methods of evaluation were used for registering prior and after implementation of the project. The study included social, economic and environmental indicators for evaluation. The performance of the project was noted in terms of flood reduction and increase in area under cultivation leading to increased crop yield and better economic conditions of the farmers. Community participation was low and was in terms of cash payment, manual labour and assisting in the execution of the project.

The study by Gowda and Satish (2011) reveals increased employment opportunities, overall increase in income, increase in consumption levels, reduction in income gaps and migration due to project implementation. Using the baseline survey conducted by The Energy Research Institute (TERI) and a detailed investigation survey at the micro watershed level the study covered 10%

samples through a combination of purposive and random sampling methods. There was also an increase in crop yields by 6 to 15%, increase in ground water level by 3 – 5 ft, increase in milk production by 15 to 20%, increase in fuel wood & fodder availability and increase in productivity in non-arable lands by 5-10%.

Many other studies in the Indian context reveal benefit cost ratios to be favourable in watershed treated areas than non treated areas (Chandrudu (2010), Jally *et al.* (1995), Ninan and Lakshmikanthamma (1994), Rama Mohan Rao *et al.* (1995), Sharma (1995), Singh *et al.* (1995), Swarnalatha *et al.* (1994), etc.

Table 2.2 Evidences of Positive Impacts of WSD Projects

Key Findings from Different Studies
• Soil loss and surface runoff reduced by 52% and 58% respectively, in completed watersheds. • Area under irrigation increased in almost all watersheds. The extent of this increment ranged from 34% to 100% in different watersheds. • The area under sowing increased. The cropping intensity increased. • Productivity/ yields of crops increased and the net returns also increased (up to 63%). • The Benefit Cost Ratio of watershed project • Interventions were influenced by type of intervention and type of crops grown. However, all studies clearly indicated a positive Benefit Cost Ratio, which ranged from 1.10 to 15.72 (in different parts of the country), depending on the above factors. • The availability of drinking water improved in all project villages. The ground water situation also improved in all project villages. • Other benefits such as fodder availability, employment opportunities (and also equal wages in limited number of cases) and income generation opportunities improved significantly in all villages where watershed projects were implemented.
Source: Adopted from Chandrudu Rama M V (2010) [available at www.**india**waterportal.org/.../**india**waterportal.../Future%20Search_ [Based on studies conducted by ICRISAT; GIDR; DSC; WASSAN; TERI; AKRSPI;TARU; Water conservation Mission, GoAP; WOTR and others]

Mixed outcome

There are also studies, which point out that watershed programmes necessarily may not always result in positive outcome. Although pprofitability is key factor expected by stakeholders in watershed management estimating costs and benefits, both at the farm level and beyond, has proved difficult (Salah 2008). For example, the study by Deshpande and Reddy (1994), which examines the impact of National Watershed Development Project for Rainfed Areas (NWDPRA) in Maharashtra using `with-without' approach across different agro-climatic conditions in the state, reveals crop- yields to be higher among non-beneficiaries vis- à-vis beneficiary households. Barring some of the projects viz. Aga Khan Rural Support Programme (AKRSP) in Gujarat, Mysore Rural Development Agency (MYRADA) in Karnataka, Gram Vikas Trust (GVT) in Madhya Pradesh and Rajasthan, Seva Mandir in Rajasthan, Karnataka Watershed Development Project (KAWAD), Western India Rainfed Farming Project, and Doon Valley Project (DVP) in Uttarakhand and success stories such as Ralegaon Siddi, Sukhmajari and Rajiv Gandhi Watershed Mission in Madhya Pradesh, a large number of studies on watershed projects in different parts of the country have indicated mixed results especially on economic impact (Chopra 1999 cited in Shah *et al.* 2004:3).

The Ministry of Rural Development carried out an evaluation of three watershed programmes viz. IWDP, DPAP and DDP in 2000 based on a survey of 426 watersheds spread over 53 districts of 20 states (AFCL 2000). Although the study found increase in agricultural productivity and annual household income, community involvement was found to be low as bodies like Watershed Associations and Watershed Committees were created parallel to PRIs diluting the functions of the later. Assets created were found to be of substandard nature. In many cases, the land already under cultivation was taken up under IWDP without leaving any scope for further development. In Karnataka also there was reported increase in agricultural yield of major staple crops, while livestock

development was neglected. The assets created under the programme were found to be under repair conditions.

Watershed Support Services and Activities Network (WASSAN) carried out an impact assessment study of 100 watersheds in 2009 in Uttar Pradesh in 16 districts covering 2806 beneficiaries (Rao, 2010). The watersheds represented different programs like NWDPRA, IWDP, DDP, EAS and DPAP in different periods managed by different agencies-both government and civil societies. The information was collected on family background, income sources, asset holding, benefits availed from watershed program, perception of impact of the benefits, change in education, health and social status of the household. The study found lack of awareness, lack of community participation, ineffective training and lack of institutional building in implementation of the programmes. Further it was found that the focus was on works rather than the processes and involvement. The officials did not have a plan for undertaking the works till the seventh stage of watershed treatment programme and transparency in execution of works was minimal as reflected by absence of proper records to support works undertaken.

Shah *et al.* (2004) studied the Integrated Watershed Development Projects (IWDP) supported by the Ministry of Rural Areas and Employment in three states with different agro-climatic conditions and topography covering dry land of Gujarat, forest area of Chattisgadh and hilly area of Uttaranchal. They used socio-economic, institutional and environmental indicators. These three indicators were identified to capture the pre-project scenario with respect to socio-economic conditions, natural resource status, and need for institutional support and people's participation. The results indicate mixed response to watershed development as there are differences in priorities according to soil and location specific conditions in three different states. Irrigation was a priority in Amreli in Gujarat, while checking soil-water erosion was a challenge in Dehradun in Uttaranchal and regeneration of forest and other community resources was the need in Rajanandgaon in Chhatisgadh. Although irrigation

facility and employment were the main expectations from the watershed project, people were indifferent to the project in terms of assessing employment benefits. A few villages witnessed increase in vegetation cover. Large number of households indicated lack of participatory approaches in the functioning of the watershed committee.

The analysis of watershed evaluation reports carried out by Singh *et al.* (2010) pointed out both positive and not so impressive outcomes in terms of many indicators like ground water level, surface water, irrigation facility, water regeneration capacity, land use pattern, cropping pattern, livestock production, employment generation, income generation and debt reduction. This study is an analysis of different watershed evaluation studies carried out for the period 1998-2002 on different schemes implemented by the Central government covering 12 states. On the other hand, the analysis revealed that the projects left behind communities during implementation and post implementation phases and little attention was given to their training, capacity building, social audit, women participation, and sustainable income generation. The focus was on physical and biological indicators with little emphasis on socio-economic indicators.

2.8 Watershed Development and Poverty Alleviation

Although poverty reduction is usually an objective of watershed management programs, empirical evidence of poverty reduction impacts is found to be weak in many of the studies. Most projects reviewed included poverty reduction among their objectives, but there was little evidence of any ex ante analysis of poverty that would have helped to improve project design, and actual impacts were rarely measured (Salah et al, 2008). Potential trade-off with poverty alleviation may arise because watershed development may benefit landholders while harming landless people, particularly herders and women (Kerr 2002).

Treatment of non arable and community land was found to be neglected in rainwater management as revealed in the evaluation of watersheds in Tungbhadra, Nagarjunsagar and Nizamsagar river valley projects in Karnataka

carried out by Soil Conservation Research Centre (2000). This study revealed that projects were implemented based on farmers' acceptance neglecting technicality and feasibility of the project implementation. Other drawbacks noted by the study include, weak extension services, distribution of seeds on desire basis, accumulation of silt, shortage of conventional feed and weak implementation of the project.

Hope (2007) using propensity score matching method (participants in the treatment watershed are compared with non participants in non treatment watershed) studied changes in agricultural returns during kharif and rabi seasons and domestic water collection times in Dudhi watershed in Madhya Pradesh. Social impacts are estimated on agricultural crop income and domestic water access. These indicators are chosen to understand the land based impact, which are likely to benefit private land owners and, a public good impact on domestic water access, which affect all sections. Findings of this study indicate no gain in either kharif or rabi crop income and an increase in domestic water collection compared to a non treatment group of households from an adjacent watershed matched on their propensity scores. The study reveals that watershed project has not contributed for reducing poverty in the project area.

The impact of Sujala watershed project on improving the economic condition of the beneficiaries has been addressed in a study by Devendrappa and Syed (2011) by analyzing the income generating activities of self help groups in four villages of Dharawad taluk in Karnataka, which were purposively selected based on the maximum number of vulnerable SHG members who had participated in training programmes viz. tailoring, agarbatti, detergent powder or candle making. The study reports an increase of 18.6 per cent in tailoring skills, 23.92 per cent in agarabatti making, 37.6 per cent in soap detergent powder making and 48.32 per cent in candle making skills due to participation in training. However, beneficiaries were not happy with marketing facilities, which

indicates lack of coordination, follow up and linkages essential for the benefits to be realized in real terms.

2.9 Conclusions

Most of the studies on watershed management in India have reported significant changes in bio-physical aspects than in social and institutional aspects. Although there are many studies carried out using various methodologies and indicators, there appears to be a need for micro watershed studies to draw lessons for developing local/region specific watershed programmes. The studies have covered policy related issues, institutional drawbacks, implementation issues, creation of watershed structures, community management, participation issues, etc. Government commitment to the program and simplicity and clarity on responsibilities are important factors found to have resulted in success of watershed treatment projects. The interface between local government, technical agencies, and community organizations needs to be carefully defined and managed, and capacity building at all levels is essential (Salah *et al.* 2008) for success and sustainability of the project.

Lack of people's participation in planning, implementation and maintenance, poor planning of the project components, imposition of the targeted design and lack of monitoring and limited scope for sustenance of the project are the main factors pointed out against the success of watershed development programmes. Those having participatory approach and managed by NGOs have performed well in conserving natural resources and improving agricultural productivity.

Although watershed development programmes are likely to have positive externalities in terms of improvement in local natural resources due to treatment of micro watersheds, involving community in watershed programmes is not an easy task as the benefits are often not individual, visible and are not recognised in short run. Watershed development programmes are at best when they originate from local demand, suit local conditions, involve beneficiaries in planning, execution, implementation and maintenance.

CHAPTER -III

SAMPLING DESIGN AND METHODOLOGY

In the background of the literature review and conceptual framework discussed in Chapter II, we planned the methodology for conducting the empirical study for analysing the project performance and for exploring the linkages between community based SWP and poverty alleviation.

3.1 Methods

The households are selected as the units of analysis. The quantitative component of the study was conducted mainly as 'before and after' design including different types of interventions and treatment under watershed. Households not covered by SWP within the sample village itself constituted a control group of non-project households.

Drawing from the literature the researcher followed **'before' and 'after' approach and 'with' and 'without'** scenario for analyzing the changes in socio-economic and institutional indicators in watershed treatment area.

'Before and 'after' approach: In this method beneficiaries are asked to report their current socio-economic status by recalling and comparing their status earlier to implementation of the project. Beneficiaries are also requested to report on perceived benefits of watershed treatment in terms of increase in soil moisture, ground water level, improved vegetation in the village, their contribution and participation in management, involvement in micro finance, etc. The term 'before' refers to the year 2004-05 and the term 'after' refers to the year 2010-11.

The discussions presented in Chapter V on Sujala Watershed Project is based on the comparative analysis of the baseline scenario with the final outcome as available from project documents and as recorded by project implementing

agencies reflected in their project reports. Since the researcher himself cannot reflect the status of bio physical indicators 'before and after' the project implementation based on his own investigations, the project records and reports are used to present the scenario 'before and after' with respect to these indicators.

We capture 'after' project situation by recording the actual current status of different indicators vis-à-vis asking hypothetical question of what was the situation before implementation of the project on the same indicators. In addition, to capture the differences in current socio-economic status of beneficiary vs. non beneficiary households we have included the later in the sample as control group.

'With' and 'without' approach: This approach involves comparison of data on selected indicators collected for beneficiaries/households in treated area with similar data on non beneficiaries/households in non treated area.

To establish cause and effect relationship of watershed treatment it is necessary to compare on farm and off farm situation and changes thereon related to beneficiaries in watershed treatment area with non beneficiaries in non treated area with similar characteristics. The literature suggests taking a control group from a different village with similar geographic, climatic and socio-economic features. In this study the researcher has chosen non beneficiary households from the same village but who are not benefitted by the project and whose agricultural land does not fall in the selected micro watershed.

It is clear that the year before initiating the project (2004-05) and the year after completion of the project (2010-11) i.e. when survey was carried out are normal years. The collected information referred to pre project period (i.e. before 2004-05) and after project period (i.e. current details in 2010-11).

Micro-watershed is generally defined by its boundaries of about 500 ha to 1000 ha and may cover one or many villages.

3.2 Indicators

To assess project performance of SWP on socio-economic status of the beneficiaries, multiple indicators largely based on respondents' perceptions are chosen for the study. Responses to select indicators were based on respondents' recall capacity that could relate changes over a period of three years from 2006-2009. The poverty issue in many of the watershed project impact studies is addressed through the main indicators discussed under socio-economic component listed below, which are also used in this study:

I. **Socio- Economic indicators**: The indicators included in the study and captured through survey instrument: social group, educational level, occupational status and annual earnings of household members by age and sex, household income, landholdings, extent of irrigation, type of house and nature of ownership, source of water supply, availability of toilet facility, consumer durables and agricultural assets, livestock holding and earnings, cropping pattern, cropping intensity, agricultural yield, migration status, share of households below poverty line, wage rates and income level in real terms, agricultural yield, cropping intensity, etc.

II. **Institutional/Community Participation:** Awareness about the objectives and components of the project, participation in watershed committee and/or self help group, expectations from watershed project, formation of SHGs, borrowing from various sources, contribution towards watershed treatment, etc.

III **Bio-physical Indicators:** Number of water harvesting structures, ground water level, vegetation cover (seedlings planted), etc as available from secondary sources or household survey.

The above indicators are analysed in terms of the situation before and after project implementation.

3.3 Sampling Design

As discussed in Chapter IV, the Sujala watershed project is being implemented in select six districts of Karnataka. For the purpose of the present study the researcher selected Dharwad district for an intensive evaluation. Dharwad district consists of five taluks and the project is implemented in all the five taluks covering 79 villages and, three phases of implementation have been completed. In the background of the limitations of the studies based on recall capacity of the respondents guessed from the review of literature, the researcher covered a period wherein the recall capacity would be relatively higher for studying the socio-economic impact of watershed development intervention i.e. choosing the watersheds that have been treated and completed in the third (last) phase for an in-depth study. The entire period of the project in three phases was from 2001 to 2009 while the third phase was initiated in 2006 and was completed in 2009. So the researcher thought third phase was the right base for conducting this empirical investigation. The household survey was carried out during 2010-11. The third phase covers 4 sub watersheds, two each in Hubli and Dharwad taluk as shown in Table 3.1. The specific sub watershed chosen in Dharwad taluk is Amblikoppa covering 12 micro watersheds including Amblikoppa watershed village. The second sub watershed chosen is Devargudihal watershed in Hubli taluk covering 10 micro watershed villages including Devargudihal watershed village. Finally, Amblikoppa and Devargudihal micro watersheds from each of the sub watershed as mentioned above are selected to draw sample of households for the empirical survey (see Table 3.2).

Table: 3.1 Sub watersheds covered under Sujala Phase III in Dharwad district under Northern Transition zone

Agro Climatic Zone	District	Sub Watershed	Geographical area (Ha)	Treated area (Ha)	Private land (Ha)	Common land (as % to total)	Untreatable area (Ha)
Northern Transition	Dharwad	Amblikoppa Unkal Devargudihal Bennihalla	26281	17640	15618	2022 (11%)	4397

Source: Source: Agricultural Finance Corporation Limited (2011)

Table 3.2: Taluka wise Selected of Sub watersheds

Agro Climatic Zone	District	Taluks	Sub Watershed	Area	Geographical area (Ha) of Sub Watershed	Field NGO Name	Treated area under micro watershed (Ha)	No of Micro Watersheds
Northern Transition	Dharwad	Dharwad	Amblikoppa	Rural	8761	BDSSS	1037	12
			Unkal	Urban/Rural	5155	IDS	1164	6
		Hubli	Devargudihal	Rural	6942	BIRDS	689	10
		Kundgol	Bennihalla	Urban/Rural	6333	Mother	-	7
Total		**3**	4		**27191**			**35**

From the table 3.2 there are four sub watersheds implemented in three taluks (namely Dharwad, Hubli and Kundagol) under phase III of Sujala watershed project. These four sub watersheds covered 35 micro watersheds and 27191 Ha of geographical areas. The NGOs like BDSSS, IDS, BIRDS, Mother are actively involved for implementation and maintenance of these sub watersheds in the district.

Table 3.3 Sample Framework

Taluk	Sub Watershed	No of Micro watersheds & Area covered (Ha)	Selected Micro Watershed	Geographical area of the village (Ha)*	Treated area (Ha)
Dharwad	Amblikoppa	12 (8761)	Amblikoppa	526.00	1037
Hubli	Devargudihal	10 (6942)	Devargudihal	869.00	689

*Treated area of Amblikoppa micro watershed is more than geographical area because beneficiaries are the residents of Amblikoppa, but their land belongs to neighbouring revenue village.

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The watershed villages Amblikoppa and Devargudihal selected for the study consist of 180 households and 320 households respectively. For a wider coverage it was decided to include **50%** of the households as sample for empirical investigation. Accordingly, the sample size amounts to 90 households for Amblikoppa watershed village and 160 households for Devargudihal watershed village. Total sample size is 250. It was decided to include around **30%** of the total sample as non beneficiaries, which amounts to 27 for Amblikoppa and 48 for Devargudihal. But, during the field survey we could not cover 2 non beneficiary households in Amblikoppa and 4 non beneficiary households in Devargudihal due to their migration in search of work to other places. Since it was difficult to identify non beneficiary households, the gap was filled in by covering beneficiary households. It was also decided to include landless beneficiaries and landless non beneficiaries in the sample for a comparative analysis amounting to not less than **10%** of the total sample. Fifteen percent of our sample (23+14) included landless households from both the

categories. Table 3.4 shows sample coverage within the selected two watershed villages.

Table 3.4: Distribution of HHs according to Beneficiary and Non beneficiary

	Amblikoppa	Devargudihal	Total	Grand Total
	No. of HHs	No. of HHs	No. of HHs	
Beneficiary with land	53	93	146	177
Landless Beneficiary	8	23	31	
Non beneficiary with land	21	30	51	73
Landless non beneficiary	8	14	22	
Group Total	**90**	**160**	**250**	**250**

Source : Primary Survey data

Selection of Beneficiaries

For choosing the beneficiary/non beneficiary households the researcher made a careful reading of the project documents and beneficiary details. A list of all farmers and landless beneficiaries covered by the Sujala watershed project and availed facilities of the project was prepared. The register no of the household as recorded in gram panchayat records was taken as household number for identification under random selection. Households were grouped into four categories viz. beneficiaries with land, landless beneficiaries, non beneficiaries with land and non beneficiaries without land and assigned serial No. From each group households were selected randomly using random number tables in accordance with their percentage share in total sample. All the households in each of the category with household numbers that tally with random numbers are selected for household survey. In case of non response from any household immediate next household was approached for discussion.

3.4 Data Sources

The study is based mainly on three primary sources of information with supporting inputs from project related documents and review of available studies. Three structured questionnaires were developed for data collection. They were pilot tested before the main survey. Based on the experience gained from pilot testing the schedules were modified wherever needed and finalized. The final schedules were used to elicit the information from the respondents by personal interview method. The first one was administered at the household level to elicit information from beneficiary and non beneficiary households. Second schedule was for recording perceptions of villagers in two selected villages comprising of village elders, members of women's groups, youth clubs, water management groups, landless, etc., wherein the information was gathered through organizing focused group discussions. Third was the checklist used for eliciting information through oral discussions with facilitators i.e. NGOs.

Secondary Sources:

(i) The required project related data is obtained from the offices of the project implementing agencies and relevant government departments. Project reports and documents highlighting baseline scenario and post project scenario, activities carried out, beneficiary details, etc. This forms the basis of analysis in **Chapter V** focusing on bio-physical and institutional indicators. The secondary data was augmented by discussions with technical and field staff of Sujala Watershed project.

(ii) Gram panchayat records relating population, no of households, etc.

(iii) Literature on watershed development related studies

The primary data is collected from three sources:

(i) The quantitative data on socio economic indicators is collected from a survey of randomly chosen beneficiary and non beneficiary households in selected two villages.

From the household survey the researcher tried to gather information on socio-economic indicators such as nature and type of house, educational and occupational status of household members, land holdings, livestock rearing, household and agricultural asset position, income generating activities, reduction in migration, percentage share of households below poverty line before and after project implementation, wage rates and income level in real terms, cropping pattern, changes in agricultural yield, cropping intensity, perceptions of beneficiaries on benefits of the project and gaps in implementation, etc. To understand the extent of community participation information was gathered on awareness about SWP, contribution of beneficiaries to the project in terms of cash and kind, formation of SHGs, Area Groups, Water management Committees, etc.

The information from household was collected through administration of pilot tested schedules.

(ii) Focused Group Discussions (FGDs)

The qualitative information supported the quantitative investigation in knowing people's key concerns and how watershed projects affected them. The qualitative data is gathered from focused group discussions with a group comprising of village elders, panchayat presidents, representatives of women's groups and youth, skilled labour, farmers and landless labourers, members of water management committees or area groups. The information from FGDs was collected through a semi structured check list comprising of open ended questions.

(iii) Thirdly, the researcher tried to capture the role of private agencies i.e. NGOs through an interactive discussion using a brief checklist to understand their role as facilitators. In Amblikoppa Belgaum Diocesan Social Service Society (BDSSS) and in Devargudihal Bijapur Integrated Rural Development Society (BIRDS) have worked all through the implementation process of the project to

create awareness among the villagers to adopt watershed treatment and have guided them to avail the benefits of the project through contribution and participation.

3.5 Statistical methods

Descriptive statistics viz. sum, averages, percentages, cropping intensities, conversion of current prices in to real terms, etc., form the main components of statistical methods used in analyzing the results of the study. To convert current prices in to real terms the researcher used GDP deflator for 2004-05 as base year. The quantitative data on socio economic indicators is collected from a survey of randomly chosen beneficiary and non beneficiary households in selected two villages, representing two micro watersheds covered by World Bank assisted Sujala Watershed Management Project in the IIIrd phase of the project during 2006-2009.

CHAPTER-IV

PROFILE OF STUDY AREA

4.1 Introduction

The portrayal of the profile of the study area aims at providing comprehensive socio-economic scenario as a backdrop for an in-depth analysis of the core aspects of the research problem. The socio-economic dimensions have a profound impact on the social and economic structure of the area which comprise of demographic features, occupational status of the people, economic conditions of the people and infrastructural framework governing the social and economic life of the people, etc.

Keeping in view of these broad aspects of the socio-economic, environment of the study area an attempt has been made here to present the following aspects of the profile of Dharwad district.

- ❖ Geographical location and topography
- ❖ Demographic characteristics and occupational distribution of the population
- ❖ Education
- ❖ Agriculture and land use
- ❖ Transport and communication
- ❖ Cultural and other information

In this section a brief profile of the study area especially with demographic and socio-economic characteristics of the selected villages.

4.2 District and Selected Taluks Profiles

Dharwad district has been selected for the micro-level study from amongst 30 districts in Karnataka. This district is located in the northern part of Karnataka state. It is lying between North Latitude 15° : 15′ and 15° : 35′ and East Longitude 75° : 00′ and 75° : 20′. The district now consists of five taluks viz. Dharwad, Hubli, Kundagol, Kalaghatagi and Navalgund. According to

High Power Committee on Redressal of Regional Imbalances Report (2002) Dharwad district has both backward and developed taluks. Hubli and Dharwad taluks are relatively developed taluks in the district and Kundagol, Kalaghatagi and Navalgund are backward taluks in the district. Sujala water shed Phase 3 had implemented in Hubli (Unkal and Devargudihal), Dharwad (Amblikoppa) and Kundagol Taluk (Bennihal) among 5 taluks of the districts. Hubli and Dharwad taluks have been selected for the study purpose.

4.2a. Socio-Economic Profile of Selected District and Taluks

Table 4.1 shows district has a total geographical area of 4263 sq.kms. The district receives rains from north-east. The average rainfall in the district is 787 mm. The district has a total population of 1604253 as per 2001 census. Male and female population in the district, were 823204 and 781049 respectively. The table also provides the details of selected taluks population. It is clear from the above table that Taluk wise Dharwad taluk accounts for the maximum number of geographical area (24.2%) in the district, while Hubli taluk (14.8%) has the minimum number of geographical area in the district.

The average sex ratio in the district is 949 women for every 1000 men as per 2001 census. Dharwad taluk had the highest sex ratio of 951 women for 1000 men followed by Hubli 945 women for 1000 men. Taluk wise figures indicate highest density of population in Dharwad and Hubli taluks have lowest density of population than the average density of population in the district at 377. The district has a total number of 297494 households. Of these, there are 166802 households in urban areas and 130692 households in rural areas. The average literacy rate among the male and female population in Dharwad district is 71.60 percent as per 2001 census. Male literacy was higher at 80.80 percent compared to female literacy rate at 61.90 percent. Literacy rate of urban areas was higher at 80.30 percent compared to rural areas at 60.80 percent in the district.

Table 4.1: Profile of Dharwad District and Selected Taluks

Particulars	Dharwad Taluk	Hubli Taluk	Dharwad District Total
Geographical Area (sq.kms)	1032 (24.2%)	631 (14.8%)	4263
Population	218961	128380	1604253
Male	112239	66000	823204
Female	106722	62380	781049
Sex Ratio	951	945	949
SC Population	19692	11548	144342
ST Population	14222	8982	109991
Density of Population (Per sq.km)	219	217	377
No of Households	39138 (13.2%)	23249 (7.8%)	297494
No of Households in Rural	36246 (27.7%)	23249 (17.8%)	130692
Literacy Rate	59.2	63.1	71.60
Male Literacy Rate	70.4	75.5	80.80
Female Literacy Rate	47.5	49.9	61.90
Literacy Rate in Rural Area	57.7	63.1	60.80
Literacy Rate in Urban Area	77.8	0.0	80.30
Average Rainfall	NA	NA	787 mm

Source: Dharwad District at a Glance 2010-11. District Statistical Officer, Dharwad

4.2.b. Agriculture Activities and Land Holdings in Dharwad District

Agriculture is the main occupation in the Dharwad district. Table 4.2 shows the total area sown in the district is 512031 hectares. Of this the net area sown is 310816 hectares and the area sown more than once in 2010-11 was 201215 hectares. Dharwad taluk had the highest net area sown than the Hubli. The district has 26290 marginal agricultural land holders (Below 1 ha). There were 40672 small agricultural land holders (1-2 ha), semi-medium land holders (2-4 ha) in Dharwad district numbered 34901. The district had 20805 medium

land holders (More than 10 ha) in Dharwad district numbered 3497. It is evident from the table that small holdings dominate agriculture in Dharwad district with 40672 small holders followed by 34901 semi-medium land holders, 26290 marginal land holders, 20805 medium land holders and a small number of 3497 large agricultural land holders.

Marginal and small agricultural land holders accounts for the more than 50 percent of the total agricultural land holders. This indicates not only poverty of the agricultural land holders but also uneconomic agriculture in the study area. Dharwad taluk has highest marginal land holders than the Hubli taluk. Canals, Tanks, and Tube wells are main source of irrigation facilities in Dharwad district. Canal water for irrigation is available only in Hubli taluk from the Malaprabha dam. Similarly irrigation from tanks has been facilitated in Dharwad taluk. However irrigation through tube wells is made use of in 2 taluks in Dharwad district. Tank irrigation was available for net area of 93 hectares in Dharwad taluk. Dharwad taluk has maximum of 7527 hectares (47.8%) of net irrigated area under irrigation from tube wells than the Hubli Taluk has 4054 hectares (25.7%). The district has 16 regulated markets, of these 5 are main regulated markets and 11 are sub regulated markets.

Table 4.2: Agricultural Activities in Dharwad District and Selected Taluks

Particulars	Dharwad Taluk	Hubli Taluk	Dharwad District Total
Area Sown (Hectares)	115973 (22.6%)	82557 (16.1%)	512031
Net Sown Area	77294 (24.9%)	50580 (16.3%)	310816
Total Land Holders	30233 (24.0%)	23061 (18.3%)	126165
Marginal Land holders (Below 1 ha)	6969 (26.5%)	5519 (21.0%)	26290
Small Land holders (1-2 ha)	9560 (23.5%)	7071 (17.4%)	40672
Semi-medium Land holders (2-4 ha)	8386 (24.0%)	6059 (17.4%)	34901
Medium Land holders (4-10 ha)	4576 (22.0%)	3745 (18.0%)	20805
Large Land holders (More than 10 ha)	742 (21.2%)	667 (19.1%)	3497
Irrigation Land (area in ha)	7631 (13.3%)	5868 (10.2%)	57272
Source of Irrigation			
Canals (area in ha)		1814 (4.4%)	41403
Tanks (area in ha)	93 (82.3 %)		113
Tube Wells (area in ha)	7527 (47.8 %)	4054 (25.7%)	15745
No of Main Regulated Markets	1	1	5
No of Sub Regulated Markets	1	3	11

Source: Census 2001

4.2.c. Occupation and Distribution of the Workers in Dharwad District

Table 4.3 presents distribution of workers in Dharwad district and selected taluks for the study. Total number of main workers and marginal workers were 587018 and 97474 respectively in Dharwad district. 919761 of the people got registered as non-workers. From the table there were around 94727 main workers and 16492 were marginal workers, 107742 of people were not working in Dharwad taluk. There were 53810 main workers, 13240 marginal workers and 61330 registered as non workers in Hubli Taluk. The Dharwad taluk had highest number of main workers, marginal workers than the Hubli taluk.

Table also depicts that agriculture is the main occupation in Dharwad district. District had 176588 agricultural cultivators majority of agricultural cultivators belonged to rural areas of the district. There were 17282 agricultural cultivators in urban areas. Dharwad district had a total number of 186543 agricultural labourers. The total number of non-agricultural workers in Dharwad district was 301632. Occupation wise also Dharwad taluk was dominant than the Hubli taluk.

Table 4.3: Occupation and Distribution of the Workers in Dharwad and Hubli Taluks

Particulars	Dharwad Taluk	Hubli Taluk	Dharwad District Total
Main Workers	94727 (16.1)	53810 (9.2)	587018
Marginal Workers	16492 (16.9)	13240 (13.6)	97474
Non Workers	107742 (11.7)	61330 (6.7)	919761
Distribution of the Total Workers			
Agriculture Cultivators	42963 (24.3)	25279 (14.3)	176588
Agriculture Labourers	41075 (22.0)	26865 (14.4)	186543
Household Workers	3285 (16.7)	1314 (6.7)	19729
Other Services	23896 (7.9)	13592 (4.5)	301632
Total Workers	111219 (16.2)	67050 (9.8)	684492

Source: Census 2001

4.3. Profile of the Selected Villages for the Study (Amblikop and Devaragudihal Sub-Watershed)

The two villages Amblikoppa and Devaragudihal have been selected for an intensive and in-depth field investigation on "Community Based Watershed Management and Poverty Alleviation – A Study of Sujala Watershed Project in Karnataka". Of the two villages Amblikoppa forms part of Dharwad taluk, while Devaragudihal is in Hubli taluk. The profile of the two sub-watersheds covered by the study relate to the major socio-economic aspects and about the 'Sujala' Yojana in the respective villages.

4.3.1. Profile of Amblikoppa (Sub-Watershed)

4.3.1a. Demographical Details of Amblikoppa sub-watershed:

Table 4.4 presents that the study village Amblikoppa is comes under Dharwad taluk in Dharwad district and it is covered under sub watershed programme with a total watershed area of 8671 acres. The total population of sub watershed of the Amblikoppa village is 17622. The people belonging to Scheduled Castes and Scheduled Tribes constitute a very small percentage of the total population. The Scheduled Castes and Scheduled Tribes population of the village is 6.4 percent and 8.2 percent respectively.

Table 4.4: Demographical details of selected sub-watersheds

Population Category	Amblikoppa (In Number)	Devaragudihal (In Number)
Scheduled Caste	1132 (6.4)	981(5.1)
Scheduled Tribe	1445 (8.2)	1058 (5.6)
Others	15045 (85.4)	17011 (89.3)
Total Population	17622 (100)	19050 (100)

Source: BDSSS and BIRDS (NGO's) Report submitted to Karnataka Watershed Dept. Dharwad-2009

Note: Figure is parentheses are percentage to respective total

4.3.1.b. Farmers in Amblikoppa (Sub-watershed)

Table 4.5 shows the village has a total number of 2873 farmers. The following table provides details regarding distribution of farmers according to caste and farm size. However it is significant to note that the village has maximum number of large farmers (38.0%) compared to marginal and small farmers (24.9 % and 37.1 % respectively).

Table 4.5: Distribution of Farmers based on Farm Size

Farmers	Amblikoppa (In Number)	Devaragudihal (In Number)
Marginal Farmers	716 (24.9)	969 (55.2)
Small Farmers	1066 (37.1)	402 (22.9)
Large Farmers	1091 (38.0)	385 (21.9)
Total Farmers	**2873 (100)**	**1756 (100)**

Source: BDSSS and BIRDS (NGO's) Report submitted to Karnataka Watershed Dept. Dharwad-2009

4.3.1.c. Social Groups in the Village

Table 4.6 shows that the village has a total number of 188 social/community groups consisting of Self Help Groups, Area Groups and Suaja Working (Karyakari) Group.

Table 4.6: Social/Community Groups in Amblikoppa & Devaragudihal

Social Group	Amblikoppa (In Number)	Devaragudihal (In Number)
Self Help Groups	104	98
Area Groups	72	58
Sujala Working Groups	12	10
Total	**188**	**166**

Source: BDSSS and BIRDS (NGO's) Report submitted to Karnataka Watershed Dept. Dharwad-2009

4.3.1.d. Progress of Sujala Watershed Project – Third Phase

The village has achieved significant progress in the Sujala Jalanayana Yojana. Table 4.7 indicates a very high percentage of achievements in relation to the targets both in terms of physical and financial terms. The project could be considered as a great success in its implementation in the study village of Amblikoppa.

Table 4.7: Progress of Sujala Watershed Project

Yojana Details	Target		Achievements		% of Utilised	
	Physical (ha)	Financial (Rs)	Physical (ha)	Financial (Rs)	Physical (ha)	Financial (Rs)
Total Amount of Yojana	424676	50885221	389577	47328397	91.7	93.0
Individual Land	417606	42057136	384509	37622584	92.1	89.5
Collective Land	7070	9955151	5068	9705813	71.7	97.5
Income Generating Activities	1200	9000000	1200	9000000	100.0	100.0
Others	13	1285000	13	1285000	100.0	100.0

Source: BDSSS and BIRDS (NGO's) Report submitted to Karnataka Watershed Dept. Dharwad-2009

4.3.2. Profile of Devaragudihal Sub-Watershed

Devaragudihal is a village in Hubli taluk of Dharwad district. The progress of the Sujala Watershed Project is quite impressive in the village. The following details about the socio-economic profile and the project provide a good insight into the implementation of this novel programme. The main Sujala Watershed area with Devaragudihal has a total Watershed area of 7335 hectares.

4.3.2a. Demographical Details of Devaragudihal sub-watershed

The Table 4.4 presents the total population of the Devargudihal sub watershed village is 19050. Population of the Scheduled Castes in 981 (5.1%) and Scheduled Tribes is 1058 (5.6%). The other caste people are highly populated (17011) in Devargudihal sub watershed village.

4.3.2.b. Farmers in Devaragudihal (Sub-watershed)

Table 4.5 indicates that there is a greater concentration of marginal farmers (969) than the small farmers (402) and large farmers (385) in the total number of farmers (1756).

4.3.2.c. Community/Social Groups in the Village

The Devargudihal village has community/social groups like Self Help Groups, Area Groups and Sujala Karyakari Sanghas. From the table 4.7, there are 166 community social groups in Deveragudihal sub watershed village. Other groups like area groups (58) and Sujala working groups (12) are formed in the village. The social awareness among the villages about the socio-economic progress and the efforts towards that end are indicated by the community/social groupings formed by villagers.

4.3.2.d. Progress of Sujala Watershed Project

The progress of the Sujala Watershed Project in the village is presented in the table 4.8. Table indicates details of the physical and financial targets of income generating activities under the Project. As we know SWP terms over by 2009 though about 92 percent funds were utilized for project. According to officers of SWP the Project has been a great success in Devaragudihal village in Hubli taluk of Dharwad district.

Table 4.8: Targets and Progress of Sujala Watershed Project in the Village

Yojana	Target		Achievements		Fund Utilization	
	Physical (Nos)	Financial (Rs)	Physical (Nos)	Financial (Rs)	Physica l (Nos)	Financial (Rs)
Total Amount of Action Plan	-	36499070	-	3434932 5.5	-	94.1
Individual Land	-	29044029	-	2748127 7.5	-	94.6
Community Land	-	7455041	-	6868048	-	92.1
Income Earning Activities	1000	750000	1000	750000	100	100.0
Other Village Programmes	9	900000	9	900000	100	100.0

Source: BDSSS and BIRDS (NGO's) Report submitted to Karnataka Watershed Dept. Dharwad-2009

4.4. Profile of Selected Micro Watersheds

4.4a. Socio-Economic Conditions of Selected Micro Watersheds

Above the tables (4.3 to 4.8) show details of Amblikoppa sub water shed and Devergudihal sub watershed. The present study has covered micro watersheds (Amblikoppa and Devargudihal) for gathering primary information instead of sub watersheds. Hence it is necessary to provide the information about the micro watershed of Amblikoppa village in Dharwad Taluk and Devargudihal in Hubli taluk of Dharwad district.

Socio-economic conditions of Amblikoppa Micro Watershed:

The Amblikoppa micro watershed is part of Amblikoppa sub watershed and it comes under Dharwad Taluk. Table 4.9 shows the geographical area of Amblikoppa micro watershed is 863 hectares. The total population of the Amblikoppa micro watershed is 593 with a population of 41 and 42 Scheduled Tribe and Scheduled Castes respectively. The other population (apart from SCs and STs) is 510 in the village. Table also shows about 292 farmers are covered under this micro watershed. Around 48 marginal farmers, 90 small farmers and 107 large farmers are working under this micro watershed.

Socio-economic conditions of Devergudihal Micro Watershed

The Devergudihal micro watershed comes under Devergudihal sub watershed in Hubli Taluk. Table 4.9 explains that the geographical area of Devergudihal micro watershed is 689 hectares. The total population of the Devergudihal micro watershed is 1328. The village is having around 51 of Scheduled Tribes population and 79 Scheduled Castes population. Other caste of population is 1198 in the village. Table also shows about 337 farmers are covered under this micro watershed. Around 55 marginal farmers, 57 small farmers and 64 large farmers are working under this micro watershed.

Table 4.9: Socio-Economic Profile of Selected Micro Watersheds

Sl.No	Name of the Project	Micro Watershed	
		Amblikoppa	**Devaragudihal**
1	District	Dharwad	Dharwad
2	Taluk	Dharwad	Hubli
3	Sub-watershed	Amblikoppa	Devaragudihal
4	Area of the Micro Watersheds	863 hectares	689 hectares
5	Total Population	593	1328
6	Scheduled Caste	41	51
7	Scheduled Tribe	42	79
8	Others	510	1198
9	Total No. of Farmers	292	176
10	Scheduled Caste Farmers	20	2
11	Scheduled Tribe Farmers	24	13
12	Other Farmers	248	161
13	Marginal Farmers	48	55
14	Small Farmers	90	57
15	Large Farmers	107	64
16	Total No. of Micro-watersheds	1	1

Source: BDSSS and BIRDS (NGO's) Report submitted to Karnataka Watershed Dept. Dharwad-2009

4.4.b. Community Participation

In order to enable community participation in the sujal watershed project and also there is a need to create greater awareness about the project objectives, and maintenance of the micro watershed among the rural people/users. Table 4.10 shows no of community based groups and total members in the selected micro watershed. Both the micro watersheds are having 16 different groups like self help groups, area groups and sujal executive committee etc. The sujala executive committee with the help of Belgaum Diocesan Social Service Society (BDSSS) NGO is creating awareness about Sujala water project in Amblikoppa Village and Bijapur Integrated Rural Development Society (BIRDS) NGO is working on SWP in Devaragudihal micro watershed area. About 300 people participated in these different groups in selected watershed villages. People participated more in SHG and area groups. Only 14 members participated in Sujala executive committee in each micro watershed village.

Table 4.10: Community Participation in Selected Micro Watersheds

	Amblikoppa			Devaragudihal	
Sl.No	**Community based Groups**	**Total No. of Groups**	**Total Members**	**Total No. of Groups**	**Total Members**
1	Self Help Groups	9	104	10	118
2	Area Groups	6	245	5	176
3	Sujala Executive Committee	1	14	1	14
	Total	**16**	**363**	**16**	**308**

Source: BDSSS and BIRDS (NGO's) Report submitted to Karnataka Watershed Dept. Dharwad-2009

4.4.c. Targets and Progress of Selected Micro Watersheds

Table 4.11 shows the targets and progress of Amblikoppa and Devaragudihal micro watersheds. As we know SWP 3rd phase implemented during the year 2004 to 2009. About 80 percent funds were utilized in Amblikoppa micro watershed and 95 percent was utilized in Devergudihal micro watershed. Devergudihal micro watershed utilized more funds than the Amblikoppa micro watershed.

Table 4.11: Targets and Progress of Selected Micro Watersheds

Amblikoppa						Devaragudihal				
Unit wise Targets and Progress	Target		Achievement		% of Fund Utilized	Target		Achievement		% of Fund Utilized
	Area (Ha)	Financial (Rs.)	Area (Ha)	Financial (Rs.)		Area (Ha)	Financial (Rs.)	Area (Ha)	Financial (Rs.)	
Total Project Expenditure	-	5157123	-	4320509	83.8	4306	4337875	4768	4153150	95.7
Individual Land	-	3793270	-	3192942	84.2	3762	2854894	1891	2949584	103.3
Community Land	-	1229202	-	1031867	83.9	435	665481	2877	476066	71.5
Income Generating Activities	87	6525000	87	652500	100.0	109	817500	97	727500	89.0

Source: BDSSS and BIRDS (NGO's) Report submitted to Karnataka Watershed Dept. Dharwad-2009

4.5. Profile of Selected Respondents in the Study Area

4.5.a. Distribution of Households According to Beneficiary and Non-Beneficiary Respondents

The study has covered 250 households in the two study villages of Amblikoppa and Devaragudihal in Dharwad and Hubli taluks of Dharwad district respectively for an in-depth analysis of the Sujala Watershed Project. Table 4.12 shows the study covered 250 respondent households consist of 177 beneficiary households and 73 non-beneficiary households. The sample

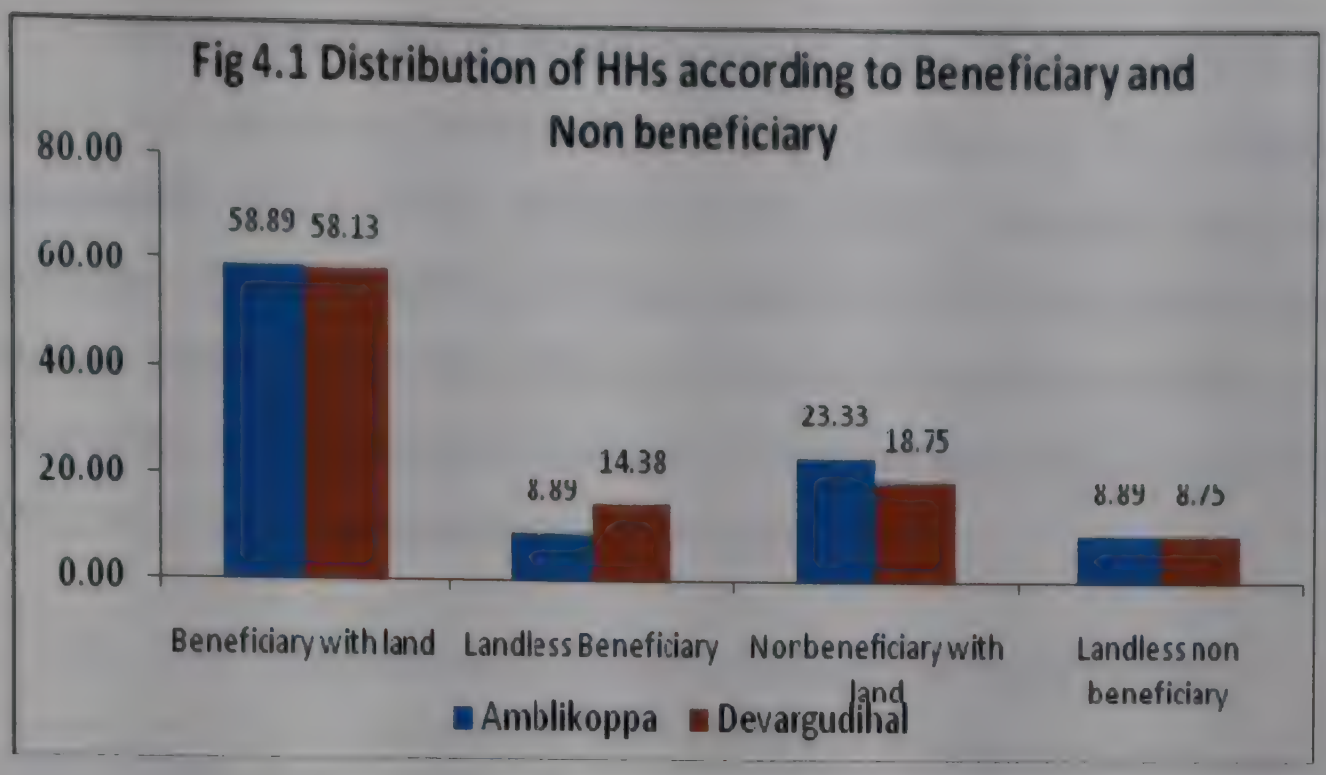
consists of 90 respondent households from Amblikoppa and 160 households in Devaragudihal village. Higher representation in the total number of respondents is given to households in Devaragudihal compared to those from Amblikoppa on the grounds of larger population and higher number of land holdings.

Beneficiary wise analysis indicates that higher representation is given to beneficiaries with land compared to those without land both in Amblikoppa and Devaragudihal. It is obviously to study the impact of the Sujala Watershed Project as the beneficiaries with land are directly involved in the implementation of the project with the financial assistance from the Government and the World Bank. Similarly higher representation in the sample is given to non-beneficiaries with land compared to those without land. The details are presented in Table 4.12 and Fig. 4.1 given below.

Table 4.12: Distribution of Households According to Beneficiary and Non-Beneficiary Respondents the Study Area

Type of household	Amblikoppa		Devaragudihal		Total	
	No. of HHs	%	No. of HHs	%	No. of HHs	%
Beneficiary with land	53	58.9	93	58.1	146	58.4
Landless Beneficiary	8	8.9	23	14.4	31	12.4
Non-beneficiary with land	21	23.3	30	18.8	51	20.4
Landless non beneficiary	8	8.9	14	8.8	22	8.8
Total	90	100.0	160	100.0	250	100.0

Source: Primary Survey, 2010-11



4.5.b. Distribution of Family Members According to Age Groups

Age has an impact on an individual's physical and mental capability in involving socio-economic activities. Economically active age groups in the community can contribute towards the social and economic development. Community based programmes like the watershed projects can be successful with active involvement of the economically active population in the age groups of 18 to 50 years. Hence the analysis of the age groups of family members of respondent households in the two study villages is made here.

Table 4.13 provides a small number of 11 members of the families covered by the study are in the tender age group of 5 years or less indicating their exclusion from the working manpower. Similarly children in the age group of 6-11 years comprised a total number of 215 in the two villages. In this age group maximum number of 155 belonged to Devaragudihal, while a small number of 60 children were from Amblikoppa. Hence child population is more concentrated in Devaragudihal compared to Amblikoppa. Maximum numbers of 721 (63%) family members of the respondents were in the age group of 15-49 years. Of these maximum of 468 belonged to Devaragudihal and a lesser number of 253 belongs to Amblikoppa.

A lesser number of 136 family members of the respondents were in the advanced age group of 50-60 years. Of this majority of 82 belonged to Devaragudihal and a lesser number of 54 family members belonged to Amblikoppa. A small number of 58 family members of the respondents were in the old age group of more than 60 years. Of these 29 members had belonged to Devaragudihal and Amblikoppa. Table 4.13 provides the details of distribution of family members of respondents according to age.

Table 4.13: Distribution of Family Members of Respondents According to Age

Age Group (years)	< 5	6-14	15-49	50-60	> 60	Total
Amblikoppa	1	60	253	54	29	397
(%)	0.3	15.1	63.7	13.6	7.3	100.0
Devaragudihal	10	155	468	82	29	744
(%)	1.3	20.8	62.9	11.0	3.9	100.0
Group Total	11	215	721	136	58	1141
(%)	1.0	18.8	63.2	11.9	5.1	100.0

Source: Primary Survey, 2010-11

4.5. C.Distribution of Heads of Household Members According to their Educational Status

Literacy and education are inputs in the development of human capital. They have an impact on the perceptions and performance of individuals in their occupations. Literacy and education influence the productivity of human resources. Hence the educational background of the heads of the households covered by the study has been obtained through field survey.

The study has revealed a high level of illiteracy among the heads of the households covered by the study in the study villages of Amblikoppa and Devaragudihal in Dharwad district. From the table 4.14, it is significant to note that 57.78 percent of heads of households in Amblikoppa and 68.13 percent of

heads of households in Devaragudihal are illiterate. Illiteracy is higher among beneficiaries of the Sujala watersheds compared non-beneficiaries in both Amblikoppa and Devaragudihal villages. Literacy without formal schooling is found among a handful of heads of the families of both beneficiaries and non-beneficiaries in the two villages. Education upto middle level is found among 25.56 percent of heads of families in Amblikoppa and 21.88 percent of heads of families in Devaragudihal village. Education upto matriculation and intermediate level is found among a handful of heads of families of the respondents. Table 4.14 and Fig 4.2presented below provide the details.

Fig. 4.2 Distribution of head of household members according to their educational qualifications

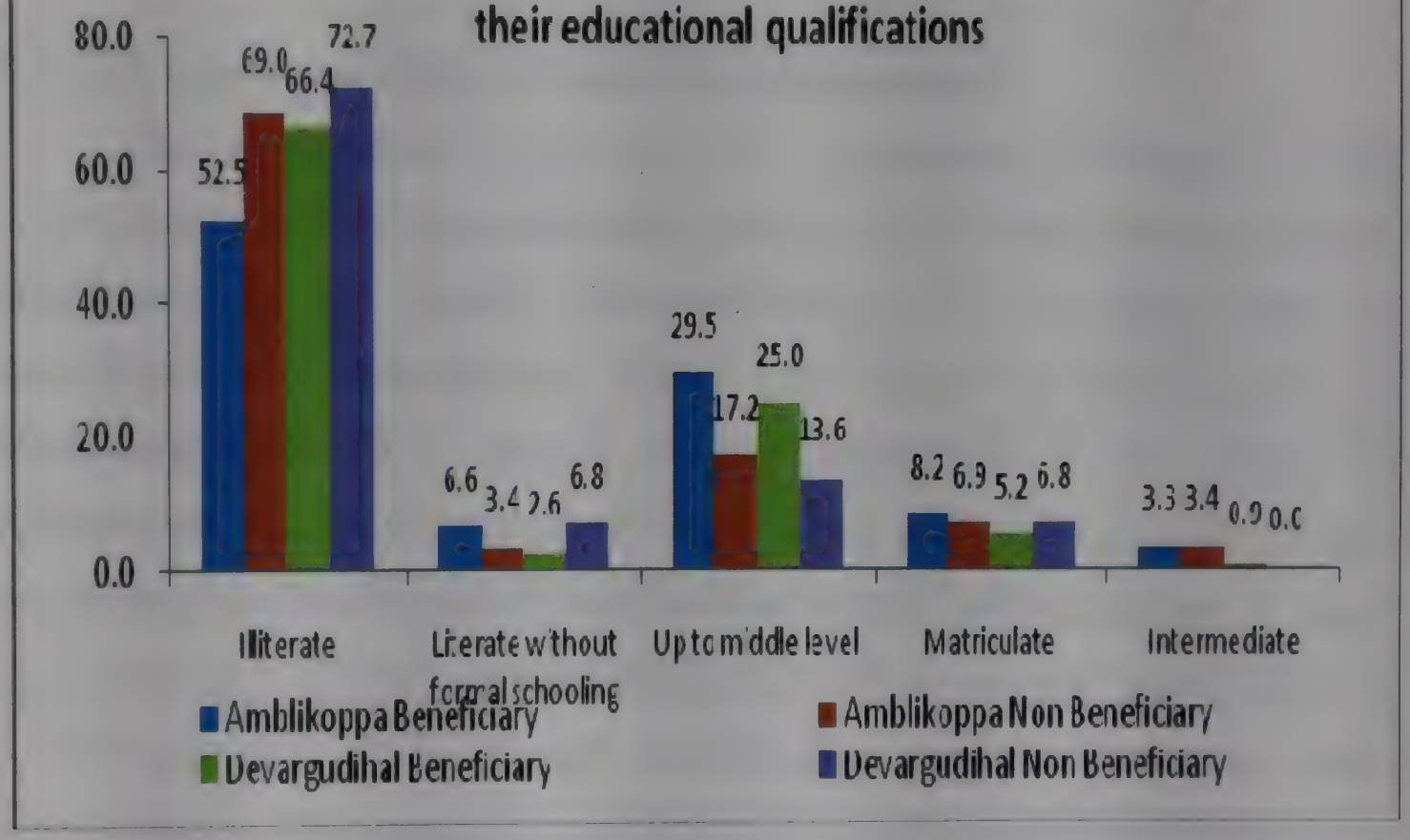


Table 4.14: Distribution of Heads of Households Members According to Educational Status

Educational Status	Amblikoppa						Devaragudihal					
	Beneficiary		Non Beneficiary		Total		Beneficiary		Non Beneficiary		Total	
	No. of HHs	%	No. of HHs	%	No. of HHs	%	No. of HHs	%	No. of HHs	%	No. of HHs	%
Illiterate	32	52.46	20	68.97	52	57.78	77	66.38	32	72.73	109	68.13
Literate without formal schooling	4	6.56	1	3.45	5	5.56	3	2.59	3	6.82	6	3.75
Up to middle level	18	29.51	5	17.24	23	25.56	29	25.00	6	13.64	35	21.88
Matriculate	5	8.20	2	6.90	7	7.78	6	5.17	3	6.82	9	5.63
Intermediate	2	3.28	1	3.45	3	3.33	1	0.86	0	0.00	1	0.63
Group Total	61	100.00	29	100.00	90	100.00	116	100.00	44	100.00	160	100.00

Source: Primary Survey, 2010-11

4.5.d. Occupational Status of Respondent Households

The occupational status of the respondent household reveals predominance of own farm agriculture both among the beneficiaries and non-beneficiaries of the 'Sujala' Watershed projects in the study village of Amblikoppa and Devaragudihal. Table 4.15 shows that 80.33 percent of beneficiaries and 55.17 percent of non-beneficiaries of the project in Amblikoppa and 65.52 percent of beneficiaries and 52.27 percent of non-beneficiaries in Devaragudihal were involved in own farm agriculture. A small number of 13.11 percent beneficiaries and 27.59 percent non-beneficiaries in Amblikoppa and 15.52 percent beneficiaries and 27.27 percent non-beneficiaries in Devaragudihal were involved in hired agricultural labour. The number of respondent households involved in other occupations was negligible. Table 4.15 and Fig. 4.3 provides the details.

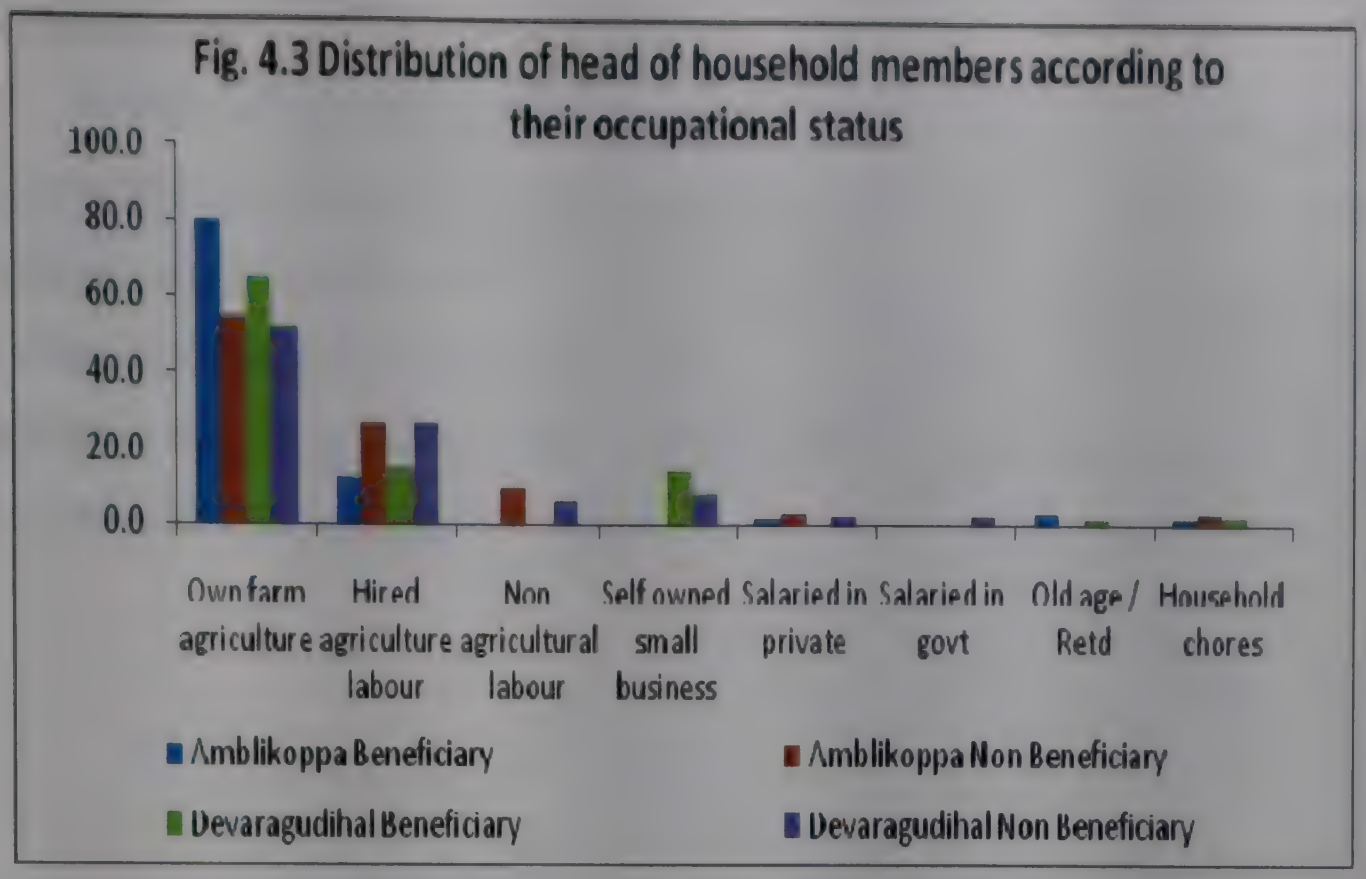


Table 4.15: Occupational Status of Respondent Households

Occupational Status	Amblikoppa						Devaragudihal					
	Beneficiary		Non Beneficiary		Total		Beneficiary		Non Beneficiary		Total	
	No. of HHs	%	No. of HHs	%	No. of HHs	%	No. of HHs	%	No. of HHs	%	No. of HHs	%
Own farm agriculture	49	80.33	16	55.17	65	72.22	76	65.52	23	52.27	99	61.88
Hired agriculture labour	8	13.11	8	27.59	16	17.78	18	15.52	12	27.27	30	18.75
Non agricultural labour	0	0.00	3	10.34	3	3.33	0	0.00	3	6.82	3	1.88
Self owned small business	0	0.00	0	0.00	0	0.00	17	14.66	4	9.09	21	13.13
Salaried in private	1	1.64	1	3.45	2	2.22	0	0.00	1	2.27	1	0.63
Salaried in govt	0	0.00	0	0.00	0	0.00	0	0.00	1	2.27	1	0.63
Old age / Retd	2	3.28	0	0.00	2	2.22	2	1.72	0	0.00	2	1.25
Household chores	1	1.64	1	3.45	2	2.22	3	2.59	0	0.00	3	1.88
Group Total	61	100.00	29	100.00	90	100.00	116	100.00	44	100.00	160	100.00

Source: Primary Survey, 2010-11

4.6 Conclusion

In view of the above socio-economic and demographic aspects indicate Dharwad district is one of the moderate developed districts in Karnataka. The discussion on the profile of the Dharwad and study area helps to understand of the socio-economic and demographic factors. The existing profile of the micro watersheds helped to better understanding of SWP plan, demographic details, occupation and situation of the villages.

Dharwad District Map

Source : www.mapsofindia.com

Amblikoppa

Devargudihal

CHAPTER-V

SUJALA WATERSHED DEVELOPMENT PROJECT AN OVERVIEW

5.1 Introduction

In this Chapter the researcher discusses project level findings in terms of baseline scenario and post project developments using the data and information available from the reports and documents of project implementing agency and department. The discussion centers around bio-physical indicators like ground water level, soil moisture content, vegetation cover, number of water harvesting structures, number of SHGs, number of Area Groups and Watershed Management Committees formed, etc., at the village level.

Watershed development aims primarily at rejuvenation of water bodies. Watershed is an area from which all water drains to a common point making it an attractive unit for technical efforts to manage water and conserve soil for improving production and conservation. Watershed is defined as a geographic area drained as a system of connecting streams such that all surface runoff originating due to precipitation in this area leaves the area in a concentrated flow through a single outlet (Singh, 2000).

Watershed program is reckoned as the engine of agricultural growth and development in fragile and marginal rainfed areas. The program covers wider aspects of social and economic life of the villagers. The program aims at overall upliftment of farming community particularly in rainfed areas.

5.2 Watershed Programme – A Priority Programme in India

Watershed development has been a priority programme at the national level. Various national level policy documents have reflected this priority aspect viz. Agricultural Policy, Water Policy, Land Policy, Forest Policy and Watershed

Development Guidelines. Different Ministries in India and International Research and Development Organizations are involved for effective planning, implementation and management of watershed through various Research and Development programmes. It was viewed that watershed programmes augment farm income, raise agricultural production and conserve soil and water resources in rainfed areas by providing appropriate technical and financial support.

History of Watershed Development in India

The concept of 'watershed management' is traced to 1880s with the Famine Commission and then with Royal Commission on Agriculture in 1928. The two commissions laid the foundation for organized research in the field of watershed for the betterment of farming community. Government of India started the first large scale watershed programme in 1962-63 to check siltation in multipurpose reservoirs as soil conservation work in the catchments of River Valley Projects. This was followed by Drought Prone Area Development Programme (DPAP) during 1972-73. The Ministry of Rural Development adopted the watershed approach and initiated at 22 locations in the rainfed areas during 1984. Several projects were launched during 1980s with assistance from bilateral donors and international funding agencies like the World Bank. A number of Non-Government Organizations (NGOs) also started working for integrated watershed development programme in different parts of the country.

The National Watershed Development Project for Rainfed Areas (NWDPRA) was launched in 1986-87 for optimizing the production of important rainfed crops in the country. Watershed Development Fund (WDF) was established by NABARD in 1991 to integrated watershed programmes in around one hundred priority districts.

5.3 Sujala Watershed Development Project

There are five different watershed programmes operating in India. They differ from one another in terms of administration planning and system composition.

1. The first group consists of Operational Research Projects (ORP) taken up by ICAR at different locations.
2. The second group is the World Bank financed watershed projects.
3. The third group is state government sponsored watershed projects.
4. The fourth is a central government assisted National Watershed Development Programme (NWDP) implemented by the state government with some modification.
5. The fifth group is the watershed project undertaken by the Non-Government Organizations (Shridhar, 2002).

Sujala Watershed Project is a World Bank sponsored project which is implemented in five districts in Karnataka viz. Dharwad, Haveri, Chitradurga, Kolar and Tumkur covering about 4.27 lakh hectares of land in 38 taluks. The project was in operation since September 2002.

5.3.a Community Cost Sharing under Sujala Project

Community cost sharing is another salient feature of Sujala Watershed Project. Under this, communities participate by contributing amount varying with activities either by cash, kind or labour. The contribution also varies with caste and land holding ensuring social and economic equity.

Sujala Watershed Project adopts distinative methods for awareness building by way of individual house visits, informal street/special group meeting, village meetings, gram sabhas, street plays, magic show, jathas, poster distribution, wall paintings, pamphlets distribution, hasiru habba/vana mahotsava, health camps, and baseline data collection.

5.3. b. Proposed Investment in Sujala Project

The total proposed investment in the Sujala Project is Rs. 676.96 crores which includes the loan from World Bank through Government of India and contribution from Government of Karnataka and the stakeholders. The following table provides the details.

Table-5.1: Total Project Investment in Sujala Watershed (Rs. in Crores)

Sl. No.	Source	Total Investment	Percent Share
1	World Bank Loan Through Government of India	523.43	77.3
2	Government of Karnataka	84.27	12.5
3	Stakeholders Contribution	69.26	10.2
	Total	676.96	100.00

Source: Operational Manual Sujala Watershed, 2005.

It is clear from the details in the above table that World Bank's contribution to the total investment is maximum at 77.3 percent of the total investment of Rs. 676.96 crore. The contribution of the Government of Karnataka is moderately low at 12.5 percent followed by the stakeholders' contribution of 10.2 percent of the total investment.

The broad objective of 'Sujala' watershed project is to increase the production potential of the watershed by involving the communities in the process through building appropriate people's institutions and training them to plan, implement and manage their own resources.

5.3. c. Objectives of the Sujala Project

Following are the major objectives of the Sujala watershed project as stated in its project document.

1. To reduce poverty and improve livelihood of the people living in the watershed area.
2. To increase production and productivity of agricultural lands.
3. To improve the status of natural resource base.
4. To increase the productivity of non-arable lands.
5. To increase the capabilities of local level institutions for sustainable management of natural resources.
6. To improve skills and create alternate livelihood options to vulnerable families in the watershed.

Aims of the Sujala Watershed Project

The main aims of Sujala watershed are reducing soil erosion, increasing soil fertility, increasing land cover, increasing cropping intensity along with replenishing of ground water, providing employment to the landless and reducing the number of families below poverty line through various income generation activities, applying space technology in planning and monitoring of the project and participatory implementation by the community for which ngos and department are the facilitators etc..

5.3.d Distinct Feature of Sujala Watershed Project

Community participation is the focus of the entire project. The project aims at strengthening capacities of communities for participatory involvement in planning, implementation, social and environmental management, and maintenance of assets emanating from local level development programme. Community participation is essential for the success of any project aimed at socio-economic development especially in rural setting where there is greater disparity in both social and economic conditions. Community participation can

ensure social inclusion. Sujala project has the core element of promotion of people participation in conservation and development activities.

Community participation under Sujala Watershed Project is facilitated through the formation of Community Based Organizations (CBOs). These CBOs not only plan, but also implement the activities. The CBOs formed under the Sujala project are;

- ❖ Sujala Watershed Sanghs (SWS)
- ❖ Area Groups (AGs) and
- ❖ Self Help Groups (SHGs)

Sujala Watershed Sanghs (SWS) consist of all the beneficiary households in the project area. The project ensures greater involvement of community through the participation of both husband and wife. The SWS Executive Committee (EC) is the functional organ of the SWS. The SWS and the EC predominantly consists of representatives from Area Groups (AGs) and the SHGs. The SWS-EC is a 14 member group of which 5 members represent SHG and 5-6 members represent AGs. Gram Panchayat is also represented in the EC by 1 or 2 members of the Micro Watershed. Gender quality is ensured by reserving 50 percent of SWS-EC membership for women. The SWS meets quarterly through Gram Sabhas and SWS-EC meets weekly.

5.3.e. Transparency in Sujala Watershed Project

Transparency and accountability are crucial for promoting good governance and essential for drawing more stakeholders and supporters in the development process. Sujala believes that being transparent in the project administration, it could demonstrate that resources are being used wisely and for the stated purpose and show that the project is being organized and managed properly. It demonstrates that the project is carrying out its activities efficiently and effectively and exhibits the successful implementation of the project that

would attract the new resources for the organization to continue its activities elsewhere. Sujala tries to ensure multiple levels of transparency and accountability through various strategies.

Sujala adopts various methods to ensure transparency and accountability at various levels viz.. wall painting, participatory planning, participatory implementation, participatory monitoring, photographing, display boards, payment through cheque, issuing beneficiaries passbook and book keeping and auditing etc..

5.3.f. Monitoring, Evaluation and Learning

Monitoring, Evaluation and Learning (M, E & L) are a central aspect of the Sujala project and are considered as a management tool, not only for effective and efficient project implementation, but also as a learning process. The approach of monitoring, evaluation and learning is unique, which has a blend of satellite and ground based monitoring system to provide information on key issues, progress and performance, social and environmental impact and support learning processes which are immediately fed back to decision making.

5.3.g. Impact Assessment of Sujala Watershed

Preliminary analysis after two years of implementation reveals that Sujala watershed project facilitate to increase vegetation cover/biomass, more number of surface water bodies, shift from annual crops to perennial crops, increased in the extent of cropped area, improvement in the soil moisture availability, generation of employment opportunities, reduction in peoples migration, reclamation of waste lands, formation of community based organizations, transparency and accountability in implementation, income generating activities for SHGs and increased awareness and skills at grass root level.

5.3.h. District-wise Selection of Sujala Watershed Project III[rd] Phase

A total number of 38 taluks in 6 districts of Karnataka state were selected for straying watersheds under Sujala Watershed Project. Of the 38 taluks 6 each were selected from Chitradurga, Haveri and Chikkaballapur districts, while 5 taluks each were selected from Dharwad and Kolar districts. Maximum numbers of 10 taluks were selected for the project from Tumkur district. Table 5.2 provides details of Sujala watershed third phase. Table shows a total number of 1270 villages were selected from these taluks. Of these maximum of 375 villages belonged to Tumkur district, 310 Kolar, 268 Chikkaballapur, 127 Chitradurga, 111 Haveri district and 79 villages belonged to Dharwad district. A total number of 77 sub-watersheds were established in the 6 districts of which 19 were in Tumkur, 14 Chitradurga, 13 Haveri, 12 Chikkaballapur, 10 Kolar and 9 sub-watersheds were established in Dharwad district. there are 742 micro-watersheds in the 6 districts of which maximum number of 202 micro-watersheds were in Tumkur district followed by 131 in Chitradurga, 122 in Chikkaballapur, 118 in Haveri, 88 in Kolar and 81 micro-watersheds were in Dharwad district. The total area under the watersheds in the 6 district was 519720 hectares of which maximum area of 134856 hectares was in Tumkur district and a minimum area of 59360 hectares was in Dharwad district.

Table-5.2: District-wise Selection of Watersheds

District	Taluks	Villages	Sub-watersheds	Micro-watersheds	Total Area (ha)
Chitradurga	6	127	14	131	106684
Dharwad	5	79	9	81	59360
Haveri	6	111	13	118	75867
Kolar	5	310	10	88	75951
Chikkaballapur	6	268	12	122	67000
Tumkur (includes Madhugiri)	10	375	19	202	134856
Total	38	1270	77	742	519720

Source: Agricultural Finance Corporation, Post Project Assessment, Sujala Phase III. (2011)

5.3.i. Breakup of Land Treated in District during Phase III (Area in ha)

Land is treated for different uses under the Sujala Watershed Projects. The total land area treated in the six districts was 218447 hectares. Of this 179685 hectares was private land, while the common land was 38691 hectares. The percentage of common land to total area treated under the Sujala Watershed Project was 18 percent. The percentage of common land treated under the Sujala Watershed Project to total land area in the 6 district varied between a minimum of 6 percent in Dharwad district to a maximum of 28 percent in Chikkamagalur district during the III Phase of the Sujala Watershed Project in Karnataka. Table 5.3 provides the details of treated land.

Table-5.3: Breakup of Land Treated by District During Phase III (Area in ha)

District	Private	Common	Total	% of Common land to Total
Kolar	23460	4009	27469	15.00
Chikkaballapur	28650	11186	39836	28.00
Tumkur (includes Madhugiri)	67865	10670	78535	14.00
Chitradurga	37068	10384	47403	22.00
Haveri	7094	470	7564	6.00
Dharwad	15618	2022	17640	11.00
Total	179685	38691	218447	18.00

Source: Agricultural Finance Corporation, Post Project Assessment, Sujala Phase III (2011)

5.3.j. Phase-wise Sujala Watershed Sanghas and Executive Committees Formed

The Sujala Watershed Sanghas and Executive Committees are formed for the implementation and execution of the Sujala Watershed Projects in the districts in Karnataka. The Phase I of the SWP could achieve the target of forming 80 SWP Sanghas, which accounted for 11 percent of the total SWP

Sanghas which were projected in the state. There was more than hundred percent increase in the number of SWP Sanghas during the Phase II of the project, when the number of Sanghas rose to 184 accounting for 24 percent of the total. During Phase III of the project the projected number of 477 was achieved accounting for 65 percent of the total number of 741 Sanghas – projected. Table 5.4 provides the details.

Table-5.4: Phase-wise Sujala Watershed Sanghas and Executive Committees Formed

Phase	Projected	Actual
I	80 (11%)	80 (11%)
II	184 (24%)	184 (24%)
III	477 (65%)	477 (65%)
Total	740 (100%)	740 (100%)

Source: Agricultural Finance Corporation, Post Project Assessment, Sujala Phase III (2011)

Area Groups Formed in Different Phases

Area groups comprising of land owners of different sizes covered by the Sujala Watershed Projects have been formed in the three phase of the SWP in the districts of Karnataka. Table 5.5 shows that total number of 4311 area groups have been formed as projected during Phase I, II and III. A small number of 504 area groups were formed during Phase I (11%), followed by 1057 area groups (24%) during Phase II. Maximum number of area groups of 2750 were formed during Phase III (65%) thus completing the total number of 4311 area groups on the selected districts of the state.

Table-5.5: Area Groups Formed in Different Phases

Phase	Projected	Actual
I	504 (11%)	504 (11%)
II	1057 (24%)	1057 (24%)
III	2750 (65%)	2750 (65%)
Total	4311 (100%)	4311 (100%)

Source: Agricultural Finance Corporation, Post Project Assessment, Sujala Phase III (2011)

5.3.k. Watershed Areas Treated Under Phase III (Area in ha)

The geographical area covered by the Sujala Watershed Project in the six districts of Karnataka is 327005 hectares. Table 5.6 reveals that Sujala watershed project treated area in the six districts is 218446 hectares. The minimum area treated was 7564 hectares in Haveri district (3.46%) and the maximum was 54043 (24.73%) hectares in Tumkur district. The untreatable area in the six districts varied from a minimum of 3766 hectares in Haveri district to a maximum of 15854 hectares in Tumkur district constituting 8.56% and 21% of their geographic areas respectively. There is a wide variation in the areas treated by Sujala Watershed Project (SWP) among the six districts covered by the project.

Table-5.6: Watershed Areas Treated Under Phase III

District	Geographical Area	Treated Area (Pvt)	Untreatable Area
Kolar	41168	27469	7431
Chikkaballapur	52237	39835	8183
Tumkur (includes Madhugiri)	106377	78535	21658
Chitradurga	66971	47403	6759
Haveri	43971	7564	3766
Dharwad	26281	17640	4397
Total	327005	218446	52194

Source: Agricultural Finance Corporation, Post Project Assessment, Sujala Phase III (2011)

5.3.l. Works Carried Out in Selected Micro watersheds

Various activities/works have been carried out in the areas covered by the Sujala Watersheds in the districts in Karnataka state. It is found that field bunds and plantations (horticulture and forest plantation) had higher share in the total number of structures. The major works carried out in selected micro-sheds included Farm Bund, Bouldern Bund, Water Ways, Hemata, Boulder Check, Vegetative Bunds, Horticulture, Farm Ponds, Nala Revetment, Forest, Waste Weir, etc. The following table 5.7 provides the details.

Table-5.7: Works Carried out in Selected Micro Watersheds

Farm Pond (Nos)	1091
Farm Bund (Running meter)	513537.7
Boulder Check (RMT)	3438.8
Waste Weir (Nos)	417
Mini Percolating Tank (Nos)	54
Water Reachable Pit (Nos)	152
Sericulture (Ha)	133
Forest (Ha)	631
Horticulture (Ha)	1420
Water Ways (RMT)	3986
Compost Pit (Nos)	22
Rain Water Harvesting (Nos)	9
Nala Revetment (RMT)	713
Open-well/Bore-well (Nos)	55
Hemata (Kgs)	388.51
Nika	16
Check Dam (Nos)	1
Diversion Channel (RMT)	179
Recharge Pit (Nos)	44
Boulder Bund (RMT)	4774
Rubble Check (RMT)	84
Vegetative Bund (RMT)	1477

Source: Agricultural Finance Corporation, Post Project Assessment, Sujala Phase III (2011)

5.3.m Crop Intensity by Zone wise

Improvement in crop intensity is a major benefit for the farmers involved in Sujala Watershed Project. Augmentation of additional water and its extended availability over larger periods of important crop seasons provides opportunities to the farmers to take more than one crop from their holdings. The intensity of crop during the three phases indicated there was marginal to moderate improvement in the crop intensity in different zones. It is observed that crop intensity in Phases I and II was higher than in Phase III. Table 5.8 provides the zonal wise details.

Table-5.8: Crop Intensity by Zones

Zones	Phase I & II (%)	Phase III		
		Before (Area in Ha)	After (Area in Ha)	Crop Intensity (%)
CDZ	155.30	759.24	848.21	111.72
EDZ	130.30	1441.63	1831.64	127.05
NTZ	135.80	1032.77	1105.28	107.02
Average	140.46	3233.64	3785.13	117.05

Source: Agricultural Finance Corporation, Post Project Assessment, Sujala Phase III (2011)
Note: Perennials Occupying 404.26 Ha during post project is excluded

5.3.n. Expenditure and Contribution of Beneficiaries in Sujala Watershed Project in Study Villages

a. Total Expenditure and Contribution of Beneficiaries

The expenditure on the Sujala Watershed Project has been largely met by the official sources. Of the total project expenditure for the group of two villages of Amblikoppa and Devaragudihal including 65 marginal land holding beneficiaries, contribution of beneficiaries was only Rs. 40274 constituting 16.64 percent, the official contribution being 83.36 percent. The beneficiaries with small land holdings (199) contributed Rs. 218735 accounting for 22.65 percent of the total project expenditure of Rs. 746967. Further the project expenditure of Rs.

368452 accounting for 22.38 percent of total Rs. 1277967 was contributed by 209 beneficiaries with large land holdings. For the group of all the 473 land holders, the project expenditure was Rs. 2276726 of which beneficiary contribution was Rs. 627461 accounting for 21.98 percent.

Village-wise contribution by marginal farmers (16) was 19.27 percent in Amblikoppa and 16.12 percent by marginal farmers (49) in Devaragudihal. Among the small farmers in Amblikoppa (139) the contribution of beneficiaries was 24.99 percent, while the small farmers in Devaragudihal (60) contributed only 19.39 percent of the project expenditure. In Amblikoppa large farmers (128) contributed 24.04 percent of project expenditure, while the farmers in Devaragudihal (81) contributed 29.25 percent of the project expenditure.

Table-5.9 : Beneficiary Contribution to Total Expenditure

Beneficiaries Contribution	Amblikoppa			Devaragudihal			Total		
	No of Farmers	Project Exp (Rs.)	Contribution (Rs.)	No of Farmers	Project Exp (Rs.)	Contribution (Rs.)	No of Farmers	Project Exp (Rs.)	Contribution (Rs.)
Marginal	16	32216 (80.73)	7692 (19.27)	49	169576 (83.88)	32582 (16.12)	65	201792 (83.36)	40274 (16.64)
Small	139	421521 (75.01)	140441 (24.99)	60	325446 (80.61)	78294 (19.39)	199	746967 (77.35)	218735 (22.65)
Large	128	703034 (75.96)	222482 (24.04)	81	57493 (79.75)	145970 (20.25)	209	1277967 (77.62)	368452 (22.38)
Total	283	1156771 (75.74)	370615 (24.26)	190	1069955 (80.64)	256846 (19.36)	473	2226726 (78.02)	627461 (21.98)

Source : BDSSS and BIRDS (NGOs) final report to Govt. of Karnataka Watershed Department, Sujala Watershed Project, Dharwad (2009)

Note: Figure is parentheses are percentage to respective total

b. Average Expenditure and Contribution of Beneficiaries

The table 5.10 provides an average contribution to total expenditure by the beneficiaries in Amblikoppa and Devaragudihal as a group of marginal, small and large farmers was Rs. 1327 The average contribution of the three types of farmers in Devaragudihal was higher at Rs. 1352 compared to those in Amblikoppa at Rs. 1310. The average contribution of large farmers in the two villages was higher at Rs. 1763 compared to small farmers at Rs. 1099 and marginal farmers at Rs. 620.

Table 5.10: Beneficiaries Average Contribution to Total Expenditure (Rs)

Type of Farmers	Amblikoppa		Devaragudihal		Total	
	Project Exp(Rs.)	Contribution (Rs.)	Project Exp(Rs.)	Contribution (Rs.)	Project Exp (Rs.)	Contribution (Rs.)
Marginal	2014	481	3461	665	3104	620
Small	3033	1010	5424	1305	3754	1099
Large	5492	1738	7098	1802	6115	1763
Total	4088	1310	5631	1352	4708	1327

Source : BDSSS and BIRDS (NGOs) final report to Govt. of Karnataka Watershed Department, Sujala Watershed Project, Dharwad (2009)

5.3.o. Activities Under Sujala Watershed Project

The study has revealed that out of 65 marginal farmers in Amblikoppa and Devaragudihal majority of 20 farmers have taken up growing teak plantation on 5.01 hectares of land, followed by 19 farmers growing mango on 11.37 hectares of land, 15 farmers growing horticultural crops while 4 farmers have involved in earthen bounding work. Individual (one each) farmers were involved in BT, bore well, forestry and other activity, while 2 marginal farmers were involved in vermin composting.

The pattern of activities of marginal farmers in Devaragudihal is largely similar with the activities of the group averages described above. However the

activities of marginal farmers under SWP in Amblikoppa indicate a difference from the group activities. Here majority of farmers are involved in horticulture (10), while a small number of 3 farmers have involved in earthen bunds. And BT, forestry and other activities are taken by each of three individual farmers. No farmer is involved in other activities like bore well, vermin compost and growing teak, mango and sapota plants.

The activities of small farmers in the two study villages of Amblikoppa and Devaragudihal also indicate a similar trend with group average. Majority of 61 small farmers have involved in horticulture followed by earthen bunds (50), teak (23), recharge pits (20) and mango (19). A smaller number of other small farmers are beneficiaries of BT (7), vermin compost (5), diversion canal (1), agriculture (1), forestry (1), sapota (1) and bore well (1 each).

The involvement of large farmers is found mainly in horticulture (56), earthen bunding (48), teak (28), mango (25) and recharge pits (17). Very few farmers have involved in BT (8), sapota (8), agriculture (7), bore well (5) and other activities.

The pattern of activities under SWP by the small farmers in Amblikoppa is largely similar with the average activities of the farmers in the group of farmers in both the villages, while the activities of small farmers are different from the average of the group activities. They are at lower level in different type of activities compared to the activities of small farmers in Amblikoppa.

The pattern of activities of large farmers under SWP in Amblikoppa, again are largely similar with the group total of farmers in the two villages. Large farmers in Devaragudihal have taken up mango (25) and teak (28) plantations. The following table provides the details.

Table 5.11: Activities of Farmers under Sujala Watershed Project

Type of Farmers	Treatment Taken	Amblikoppa		Devaragudihal		Total	
		Farmers	Land (Hect)	Farmers	Land (Hect)	Farmers	Land (Hect)
Marginal	BT	1	0.80	0	0	1	0.80
	Earthen Bunds	3	2.29	1	0.99	4	3.28
	Borewell	0	0	1	0	1	0
	Forestry	1	0.68	0	0	1	0.68
	Horticulture	10	6.90	5	0.72	15	7.62
	Vermin compost	0	0	2	0	2	0
	Mango	0	0	19	11.37	19	11.37
	Teak	0	0	20	5.01	20	5.01
	Sapota	0	0	1	0	1	0
	Others	1	0.80	0	0	1	0.80
	Total	**16**	**11.47**	**49**	**18.09**	**65**	**29.56**
Small	Agriculture	3	2.30	0	0	3	2.30
	BT	7	11.35	0	0	7	11.35
	Earthen Bunds	48	78.87	2	1.93	50	80.80
	Borewell	0	0	1	2.07	1	2.07
	Diversion Canal	3	6.50	0	0	3	6.50
	Forestry	3	3.35	0	0	3	3.35
	Horticulture	55	73.27	6	4.61	61	77.88
	Vermin compost	0	0	5	2.77	5	2.77
	Mango	0	0	19	20.30	19	20.30
	Teak	0	0	23	21.15	23	21.15
	Sapota	0	0	3	1.13	3	1.13
	Recharge pit	19	29.55	1	1.60	20	31.15
	Others	1	2.10	0	0	1	2.10
	Total	**139**	**207.29**	**60**	**55.56**	**199**	**262.85**
Large	Agriculture	7	31.72	0	0	7	31.72
	BT	8	33.40	0	0	8	33.40
	Earthen Bunds	46	183.33	2	5.10	48	188.43
	Borewell	0	0	5	4.85	5	4.85
	Diversion Canal	2	7.80	0	0	2	7.80
	Forestry	1	3.30	0	0	1	3.30
	Horticulture	45	177.03	11	29.13	56	206.16
	Vermin compost	0	0	1	0	1	0
	Mango	0	0	25	45.81	25	45.81
	Teak	0	0	28	42.45	28	42.45
	Sapota	0	0	8	12.13	8	12.13
	Recharge pit	16	66.37	1	4.29	17	70.66
	Others	3	18.20	0	0	3	18.20
	Total	**128**	**521.15**	**81**	**143.76**	**209**	**664.91**

Source : BDSSS and BIRDS (NGOs) final report to Govt. of Karnataka Watershed Department, Sujala Watershed Project, Dharwad (2009)

5.3. p. Land treated under different Activities under SWP (Hectare)

Horticulture has covered maximum of 292 hectares of land accounting for 30.47 percent of the total areas under the activities related to SWP followed by earthen bunds covering 273 hectares (28.47%), recharge pits covering 102 hectares (10.63%), mango covering 77 hectares (8.09%), teak covering 69 hectares (7.17%), BT covering 46 hectares (4.76%), agriculture covering 34 hectares (3.53%) and others covering 21 hectares (2.20%). Other activities covered lower areas of land viz. diversion canal covering 14 hectares (1.49%), sapota covering 13 hectares (1.39%), etc.

Village-wise, Amblikoppa has a maximum of 264 hectares of land (35.75%) under earthen bunds in a total area of 740 hectares of land covered by SWP followed by horticulture covering 257 hectares (34.75%), recharge pits covering 96 hectares (12.95%), BT covering 46 hectares (6.16%), agriculture covering 34 hectares (4.60%), diversion canal covering 14 hectares (1.93%) and forestry covering 7 hectares (0.99%) and other activities covering 21 hectares (2.85%).

The area covered by different SWP activities in Devaragudihal indicates much difference from that in Amblikoppa. Here the area covered by vermin compost - 77 hectares (35.64%) is maximum, followed by teak - 69 hectares (31.56%) and horticulture - 35 hectares (15.85%). The other activities covered very small areas under the Sujala Watershed Project in Devaragudihal. The contrast between the magnitudes of areas covered by different SWP activities is quite glaring as could be seen from the following table.

Table 5.12: Land Areas of Activities Covered Under SWP

Activity	Amblikoppa		Devaragudihal		Total	
	Land (Hect)	%	Land (Hect)	%	Land (Hect)	%
Agriculture	34	4.60	-	-	34	3.55
Branch Terrace	46	6.16	-	-	46	4.76
Earthen Bunds	264	35.75	8	3.69	273	28.47
Borewell	0	0.00	7	3.18	7	0.72
Diversion Canal	14	1.93	-	-	14	1.49
Forestry	7	0.99	-	-	7	0.77
Horticulture	257	34.76	34	15.85	292	30.47
Vermin compost	-	-	3	1.27	3	0.29
Mango	-	-	77	35.64	77	8.09
Teak	-	-	69	31.56	69	7.17
Sapota	-	-	13	6.10	13	1.39
Recharge pit	96	12.96	6	2.71	102	10.63
Others	21	2.85	-	-	21	2.20
Total	740	100.00	217	100.00	957	100.00

Source : BDSSS and BIRDS (NGOs) final report to Govt. of Karnataka Watershed Department, Sujala Watershed Project, Dharwad (2009)

5.3.q. Beneficiary Coverage under Sujala Watershed Project

The Sujala Watershed Project in Amblikoppa and Devaragudihal covered a total number of 473 beneficiaries of whom 283 (60%) belonged to Amblikoppa and 190 (40%) belonged to Devaragudihal. The area covered under the SWP belonging to 283 beneficiaries in Amblikoppa was 521.146 hectares (78%) and 143.76 (22%) hectares in Devaragudihal with a total of 664.906 hectares in the two villages.

A total number of 65 (13.74%) marginal farmers with 29.56 hectares of land), 199 small farmers (42.07%) with 262.85 hectares of land and 209 (44%) large farmers with 664.906 hectares of land were covered under SWP in two selected villages. The details of break up are provided in the following table.

Table-5.13

Beneficiary Coverage under Sujala Watershed Project

Type of Farmers	Marginal		Small		Larger		Total	
Village	Farmers	Area (Hect)	Farmers	Area (Hect)	Farmers	Area (Hect)	Farmers	Area (Hect)
Amblikoppa	16	11.47	139	207.29	128	521.146	283	739.91
Devaragudihal	49	18.09	60	55.56	81	143.76	190	217.41
Total	65	29.56	199	262.85	209	664.906	473	957.32

Source : BDSSS and BIRDS (NGOs) final report to Govt. of Karnataka Watershed Department, Sujala Watershed Project, Dharwad (2009)

a. Bio physical indicators

The information collected in one of the project sites (Devargudihal) by SWP and Watershed department at the end of 2008 i.e. after three years of the project intervention reveal that there was an increase in the water table in borewells and wells from 21 ft in 2006 to 15 ft in 2008 in Devargudihal. Water yield also increased from 14000 litre per hour to 20000 litre per hour during the same period. There was sizeable increase in livestock viz. sheep by 6 times, goat, cow, ox and buffalo by 2 times. Poultry rearing activities also doubled over the project period. More than 15,000 saplings were planted with a survival rate of 65% under SWP's vegetation cover.

In the village focus group discussion organized in Amblikoppa and Devargudihal villagers stated that there was an increase in soil moisture and greenery in the villages due to recharge pits, rain water harvesting structures, check dams, stone and earthen bunds during the project period as compared to the period before initiation of the project. A pictorial view of the activities carried out under SWP is provided in Annexure –V at the end of this chapter.

5.4 Conclusion

In total around 20% of the households (31% in Amblikoppa and 12% in Devargudihal) are the beneficiaries of Sujala Watershed Project. Horticulture (30.5%), earthen bunds (28.5%), recharge pits (10.7%), mango (8%) and teak (7%) plantations and branch terracing (4.8%) are the prominent activities preferred by beneficiaries. In northern transition zone in which the two villages are located experienced a cropping intensity of 107% in the third phase of the project. The basic requirement of the project that envisaged community contribution is realized through community contribution, which accounted for 22% of the project expenditure.

Annexure V

Fig. 5.1 Mango plantation and fodder raising at Amblikoppa

Source: BDSSS

Fig. 5.2 Diversion canal at Amblikoppa

Source: BDSSS

Fig 5.3 Rain Water Harvesting at Amblikoppa

Source: BDSSS

Fig. 5.4 Stone Bunding at Amblikoppa

Source: BDSSS

Fig. 5.5 Gokatte at Devargudihal

Source: BIRDS, Hungund

Fig 5.6 Check Dam at Devargudihal

Fig 5.7 Stone bunding at Devargudihal

Source: BIRDS, Hungund

Fig 5.8 Borewell Recharge Pit at Devargudihal

Source: BIRDS, Hungund

CHAPTER - VI

IMPACT OF SUJALA WATERSHED DEVELOPMENT PROGRAMME EMPIRICAL FINDINGS AND PERCEPTIONS OF THE COMMUNITY

6.1 Introduction

In the previous chapter we discussed activities under SWP at the sub watershed and micro watershed levels based on information collected from secondary sources. Household level analysis presented in this chapter reveals the impact of SWP on beneficiary households in terms of cropping pattern, household income, employment, wage rates, development of skills and community participation based on perceptions of beneficiaries and quantitative information gathered from beneficiary and non beneficiary households. The field survey has covered wide ranging socio-economic status and the transformation brought about in the socio-economic life of the respondent households covered by the Sujala Watershed Projects in the two study villages of Amblikoppa and Devaragudihal of Dharwad and Hubli taluks of the district.

The general characteristics of respondent households are discussed in section of 4.5 of Chapter IV. In this chapter the main findings of the study have been discussed in terms of the following socio-economic dimensions of the households in the context of before and after project scenario.

- Agricultural background and features [covering land holdings, size and ownership pattern of households, cropping pattern, agricultural yield, cropping intensity, etc.]
- Livestock Holding [average holding, produce and earnings from livestock]
- Labour [annual work days, additional gainful employment]
- Migration
- Wage rates
- Training [training in self employment, support activities, benefits of training, etc]
- Asset holding, [household and agricultural]
- Household income (current and constant]
- Household credit and savings position
- Direct and perceived benefits of SWP
- Overall implications of SWP on poverty status
- Community participation and NGO participation
- Revelations of FGD [post project scenario in terms of maintenance of assets, community participation, role of NGO, benefits to the village, follow up activities, etc.]
- Conclusions

The field survey has revealed significant changes in the socio-economic status of households observed after the implementation of Sujala Watershed Project in the study area. The results discussed in the following sections have practical and policy implications for rural development in the rainfed agrarian economy of the district.

6.2 Agricultural background and features

6.2.1 Type of Land Holdings by Respondent Households

The two villages of Amblikoppa and Devaragudihal in Dharwad and Hubli taluks have largely dry land farming depending upon rains. None of the households including non beneficiaries have tank or well irrigation. Majority (>70%) of the households follow dry land farming and around 4% of the land is kept fallow. The average land holding in Amblikoppa is 3.51 acres and 1.92 acres for beneficiary and non beneficiary households respectively. In Devargudihal the average land holding is 3.62 acres for beneficiary farmers and 1.42 acres for non beneficiary farmers.

According to the study, marginal land holders and small farmers are the major beneficiaries under SWP in both Amblikoppa and Devaragudihal villages, which indicates inclusion of poor under SWP. The following table provides the details.

Table-6.1

Distribution of HHs according to Size of Agricultural Land Holdings (%)

Village	Farmers Category	Marginal	Small	Medium	Large	Total
Amblikoppa	Beneficiary	35.56	42.22	17.78	4.44	100
	Non Beneficiary	72.73	27.27	0.00	0.00	100
	Total	42.86	39.29	14.29	3.57	100
Devaragudihal	Beneficiary	50.56	26.97	15.73	6.74	100
	Non Beneficiary	67.86	32.14	0.00	0.00	100
	Total	54.70	28.21	11.97	5.13	100

Source: Primary Survey Data

6.2.2 Total cultivated area under major crops

The data obtained from the two study villages about the total cultivated area under major crops indicate contrasting trend (see table 6.2). There has been a negative change in the gross cultivated area under major crops belonging to non-beneficiary farmers of the Sujala project in Amblikoppa as against positive change of growth of gross area under major crops in the same village belonging to beneficiary after Sujala project. The reduction in the area under major crops belonging to non-beneficiaries included paddy (-77.6%) and soyabeen (-27%) in kharif season, soyabean (-100%), jowar (-42%) and groundnut (-100%) in rabi season and maize (-100%) and vegetables (-100%) in summer.

A positive change is observed in area under major crops belonging to beneficiaries of the project after the implementation of Sujala in Amblikoppa. After the project implementation there was increase in area under paddy (by 10.8%) and soyabean (by 1.4%) in kharif season and soyabean (by 20.5%), jowar (by 8.6%) and maize (by 142.9%) in rabi season.

In Devaragudihal both beneficiary and non-beneficiary farmers reported reduction in the area under major crops in all the three season, except ground nut and floriculture, which witnessed an increase of 50% in kharif and 83% in rabi season for the beneficiary farmers. In summer also beneficiaries of Devargudihal could continue floriculture, which saw more than 10 times increase in area under cultivation.

In total the gross area under cultivation over all the seasons increased by 7% for beneficiaries in Amblikoppa as against reduction in area by 42% for non beneficiaries. In Devargudihal there was decline in area by 2% for beneficiary farmers and by 37% for non beneficiary farmers. One of the reasons for decline in land under cultivation for both beneficiary and non beneficiary farmers in

Devargudihal could be the sale of agricultural land to industries and real estate agencies by some of these farmers in Devargudihal. However, it is noted that the reduction in land under cultivation is higher for non beneficiaries in both Amblikopp and Devergudihal.

Table 6.2 Total cultivated area under major crops in acres

Total cultivated area under major crops (in acres)

	Before				After				% change			
	Amblikoppa		Devargudihal		Amblikoppa		Devargudihal		Amblikoppa		Devargudihal	
	Beneficiary	Non beneficiary	Beneficiary	Non beneficiary	Beneficiary	Non beneficiary	Beneficiary	Non beneficiary	Beneficiary	Non beneficiary	Beneficiary	Non beneficiary
Kharif												
Paddy	18.5	6.7	22	0	20.5	1.5	11	0	10.8	-77.6	-50.0	0.0
Cotton	3	0	1	0	3	0	0	0	0.0	0.0	-100.0	0.0
Soyabeen	93.7	35.1	76	22.5	95	25.6	66	21	1.4	-27.1	-13.2	-6.7
Jawar	0	0	6.25	1.5	0	0	3	0	0.0	0.0	-52.0	-100.0
Maize	7	0	14	0.5	7	0	10.5	0	0.0	0.0	-25.0	-100.0
Flower	0	0	19	6	0	0	18	5	0.0	0.0	-5.3	-16.7
Ground nut	2	0	6	2.5	2	0	9	0	0.0	0.0	50.0	-100.0
Sugar cane	8.5	0	0	0	8.5	0	0	0	0.0	0.0	0.0	0.0
Total	**132.7**	**41.8**	**144.25**	**33**	**136**	**27.1**	**117.5**	**26**	2.5	-35.2	-18.5	-21.2
Rabi												
Cotton	0	0	2	0	0	0	0	0	0.0	0.0	-100.0	0.0
Soyabeen	4	1.8	0	0	4.5	0	0	0	12.5	-100.0	0.0	0.0
Jowar	64	39.3	47.5	6.5	69.5	22.8	40.5	4	8.6	-42.0	-14.7	-38.5
Maize	3.5	0	5	0	8.5	0	5	0	142.9	0.0	0.0	0.0
Flower	0	0	12	3.5	1	0	21.75	0	0.0	0.0	81.3	-100.0
Green gram	5	0	0	0	5	0	0	0	0.0	0.0	0.0	0.0
Bengal Gram	2	0	0	0	2	0	0	0	0.0	0.0	0.0	0.0
Ground nut	3	2.2	12	0	3	0	7.5	0	0.0	-100.0	-37.5	0.0
Vegetable	3	0	2	0	3	0	2	0	0.0	0.0	0.0	0.0
Sapota	0	0	0	0	0	0	1	0	0.0	0.0	0.0	0.0
Total	**84.5**	**43.3**	**78.5**	**10**	**96.5**	**22.8**	**77.75**	**4**	14.2	-47.3	-1.0	-60.0
Summer												
Mango	0	0	5.5	0	0	0	5.5	0	0.0	0.0	0.0	0.0
Maize	2	0.5	9	0	2	0	7	0	0.0	-100.0	-22.2	0.0
Flower	2.1	0	4	4.5	2.3	0	45	0	9.5	0.0	1025.0	-100.0
Green gram	2.5	0	0	0	2.5	0	0	0	0.0	0.0	0.0	0.0
Ground nut	0	0	14	0	0	0	5	0	0.0	0.0	-64.3	0.0
Vegetable	0	0.5	6	0	0	0	3	0	0.0	-100.0	-50.0	0.0
Sapota	0	0	0	0	0	0	1	0	0.0	0.0	10 0.0	0.0
Total	**8.6**	**1.5**	**47.5**	**4.5**	**8.8**	**0**	**69**	**0**	2.3	-100.0	45.3	-100.0

Source : Primary Survey Data

6.2.3 Yield per acre of farm products

There is a positive change in the yield (per acre) of different crops after the implementation of Sujala watershed project ranging between a minimum of 16.7% for sugarcane to maximum of 33.3% for soyabean in Amblikoppa during kharif season. In rabi season production of vegetables and green gram witnessed 20% and 60% increase respectively. In summer also green gram witnessed similar change. The yield of flowers in summer was higher by 22% as compared to pre project period. However, for non-beneficiaries in Amblikoppa the yield levels were very low in all the agricultural seasons except for Soyabean, which experienced 25% increase in yield during kharif season. They did not grow soyabean and groundnut in rabi and maize and vegetables in summer during post project period.

In Devaragudihal also there has been an increase in the yield of all major crops except cotton, which was not grown in post implementation period (see table 6.3 for details).

Table 6.3. Crop Yield (per acre)

	Before				After				% change			
	Amblikoppa		Devargudihal		Amblikoppa		Devargudihal		Amblikoppa		Devargudihal	
	Beneficiary	Non beneficiary	Beneficiary	Non beneficiary	Beneficiary	Non beneficiary	Beneficiary	Non beneficiary	Beneficiary	Non beneficiary	Beneficiary	Non beneficiary
Kharif												
Paddy	10	8	10	0	13	8	13	0	30	0	30	0
Cotton	4	0	4	0	5	0	0	0	25	0	-100	0
Soyabeen	6	4	6	4	8	5	8	5	33.3	25	33.3	25
Jawar	0	0	5	6	0	0	6	0	0	0	20	-100*
Maize	8	0	8	8	10	0	10	0	25	0	25	-100*
Flower	0	0	9	10	0	0	11	10	0	0	22.2	0
Ground nut	12	0	12	10	15	0	15	0	25	0	25	-100
Sugar cane	300	0	0	0	350	0	0	0	16.7	0	0	0
Rabi												
Cotton	0	0	4	0	0	0	0	0	0	0	-100*	0
Soyabeen	6	4	0	0	8	0	0	0	33.3	-100*	0	0
Jowar	5	6	5	6	6	7	6	7	20	16.7	20	16.7
Maize	8	0	8	0	10	0	10	0	25	0	25	0
Flower	0	0	9	10	11	0	11	0	0	0	22.2	-100*
Green gram	5	0	0	0	8	0	0	0	60	0	0	0
Bengal Gram	4	0	0	0	5	0	0	0	25	0	0	0
Ground nut	12	10	12	0	15	0	15	0	25	-100*	25	0
Vegetable	5	0	5	0	6	0	6	0	20	0	20	0
Sapota	0	0	0	0	0	0	200	0	0	0	0	0
Summer												
Mango	0	0	100	0	0	0	100	0	0	0	0	0
Maize	8	8	8	0	10	0	10	0	25	-100*	25	0
Flower	9	0	9	10	11	0	11	0	22.2	0	22.2	-100*
Green gram	5	0	0	0	8	0	0	0	60	0	0	0
Ground nut	0	0	12	0	0	0	15	0	0	0	25	0
Vegetable	0	5	5	0	0	0	6	0	0	-100*	20	0
Sapota	0	0	0	0	0	0	20	0	-	-	100	–

* Not grown in the following year

Source : Primary Survey Data

6.2.4 Value of agriculture crops

The impact of Sujala in raging the income status of the beneficiary farmers has been positive both in Amblikoppa and Devaragudihala viewed in this context. The value of agriculture crops has risen positively after the start of the project in both the village. The positive value changes during the three seasons were maximum in case of maize for beneficiary farmers during kharif and rabi and for flower during summer season. However for majority of crops, the value of crops was negative for non-beneficiaries in Amblikoppa.

In Devaragudihala, beneficiaries experienced negative realization of total value for ground nut, paddy and jowar. There was no return from cotton because cotton was not grown in post project period. The beneficiaries received higher returns for other crops as compared to pre project returns. But, the increase in the value of crops was negative for majority of agricultural crops for non-beneficiaries. Table 6.4 presents pre project and post project value of crops for selected micro watersheds.

Table 6.4 Value of agriculture crop (Rs.)

	Before				After				% change			
	Amblikoppa		Devargudihal		Amblikoppa		Devargudihal		Amblikoppa		Devargudihal	
	Beneficiary	Non beneficiary	Beneficiary	Non beneficiary	Beneficiary	Non beneficiary	Beneficiary	Non beneficiary	Beneficiary	Non beneficiary	Beneficiary	Non beneficiary
Kharif												
Paddy	148000	42880	176000	0	266500	12000	143000	0	80.1	-72	-18.8	0
Cotton	36000	0	12000	0	60000	0	0	0	66.7	0	-100	0
Soyabeen	1124400	280800	912000	180000	2204000	371200	1531200	304500	96	32.2	67.9	69.2
Jowar	0	0	37500	10800	0	0	27000	0	0	0	-28	-100*
Maize	44800	0	89600	3200	91000	0	136500	0	103.1	0	52.3	-100*
Flower	0	0	171000	60000	0	0	356400	90000	0	0	108.4	50
Ground nut	60000	0	180000	62500	114000	0	513000	0	90	0	185	-100*
Sugar cane	459000	0	0	0	595000	0	0	0	29.6	0	0	0
Rabi												
Cotton	0	0	24000	0	0	0	0	0	0	0	-100*	0
Soyabeen	48000	14400	0	0	104400	0	0	0	117.5	-100	0	0
Jowar	384000	282960	285000	46800	625500	239400	364500	42000	62.9	-15.4	27.9	-10.3
Maize	22400	0	32000	0	110500	0	65000	0	393.3	0	103.1	0
Flower	0	0	108000	35000	19800	0	430650	0	0	0	298.8	-100*
Green gram	55000	0	0	0	112000	0	0	0	103.6	0	0	0
Bengal Gram	24000	0	0	0	40000	0	0	0	66.7	0	0	0
Ground nut	90000	55000	360000	0	171000	0	427500	0	90	-100	18.8	0
Vegetable	30000	0	20000	0	63000	0	42000	0	110	0	110	0
Sapota	0	0	0	0	0	0	200000	0	0	0	0	0
Summer												
Mango	0	0	990000	0	0	0	1100000	0	0	0	11.1	0
Maize	12800	3200	57600	0	26000	0	91000	0	103.1	-100*	58	0
Flower	18900	0	36000	45000	45540	0	891000	0	141	0	2375	-100*
Green gram	27500	0	0	0	56000	0	0	0	103.6	0	0	0
Ground nut	0	0	420000	0	0	0	285000	0	0	0	-32.1	0
Vegetable	0	5000	60000	0	0	0	63000	0	0	-100*	5	0
Sapota	0	0	0	0	0	0	20000	0	--	---	100*	---

* Not grown in the following year

Source : Primary Survey Data

6.2.5 Area under irrigation

There has not been any substantial increase in the area under irrigation during kharif and rabi season among respondent beneficiaries and non beneficiaries in both the micro watershed villages. But, beneficiaries shifted from traditional crop to unconventional crop. In Devaragudihal, farmers reduced their area under maize, jowar and shifted to floriculture. In total the area under irrigation declined by 22% in kharif and 8% in rabi. But, there was almost an increase of 122% in irrigated area due to floriculture during summer in Devargudihal. In Amblikoppa increase in area under irrigation was 5% in kharif, 20% in rabi and 10% in summer for the beneficiary farmers. While beneficiary farmers could try some crops during summer, none of the non beneficiaries attempted any crops in this season under irrigated conditions. The details are presented in Table 6.5.

Table 6.5 Area under irrigation (in acres)

	Before				After			
	Amblikoppa		Devargudihal		Amblikoppa		Devargudihal	
	Beneficiary	Non beneficiary	Beneficiary	Non beneficiary	Beneficiary	Non beneficiary	Beneficiary	Non beneficiary
Kharif								
Paddy	7	4.2	22	0	7	0	11	0
Cotton	0	0	1	0	0	0	0	0
Soyabeen	28	5.5	56	17	30	2	45	17.4
Jowar	0	0	6.25	0	0	0	3	0
Maize	2	0	6	0	2	0	3.5	0
Flower	0	0	12.25	2	0	0	16.25	1
Ground nut	0	0	6	1.5	0	0	6	0
Sugar cane	8.5	0	0	0	8.5	0	0	0
Total	45.5	9.7	109.5	20.5	47.5	2	84.75	18.4
Rabi								
Cotton	0	0	2	0	0	0	0	0
Soyabeen	1	0	0	0	3.5	0	0	0
Jowar	21	4	47.5	1	21	1	40.5	4
Maize	0	0	5	0	2	0	2.5	0
Flower	0	0	12	0	1	0	21.75	0
Green gram	0	0	0	0	0	0	0	0
Bengal Gram	2	0	0	0	2	0	0	0
Ground nut	3	2.2	10.5	0	3	0	3	0
Vegetable	0	0	0	0	0	0	1	0
Total	27	6.2	75	1	32.5	1	68.75	4
Summer								
Mango	0	0	0	0	0	0	0	0
Maize	0	0	2	0	0	0	2	0
Flower	2	0	4	4.5	2.2	0	45	0
Green gram	0	0	0	0	0	0	0	0
Ground nut	0	0	14	0	0	0	1	0
Vegetable	0	0	4	0	0	0	3	0
Total	2	0	22	4.5	2.2	0	49	0

Source: Primary survey Data

6.2.6 Cropping Intensity

Cropping intensity has not shown a significant change after the implementation of Sujala Watershed Project in Amblikoppa and Devaragudihal among the beneficiary farmers and also as compared to non beneficiary farmers.

Cropping intensity of beneficiaries in Amblikoppa declined from 246.87 to 236.40 while in Devaragudihal cropping intensity rose marginally by 3% from 163.14 before SWP to 168.12 after SWP. The overall cropping intensity remained intact at 191.44 before and after SWP for the two villages indicating no change in total land under cultivation.

For the non-beneficiary respondents also the cropping intensity in Amblikoppa declined from 177.82 to 166.46 after SWP while for Devaragudihal the cropping intensity declined from 180.94 to 167.70 after SWP. The details are provided in Table 6.6 below.

Table 6.6 Cropping Intensity under Sujala Watershed Project

Cropping Intensity	Beneficiary			Non Beneficiary		
	Amblikoppa	Devaragudihal	Total	Amblikoppa	Devaragudihal	Total
Before	246.87	163.14	191.44	177.82	180.94	179.33
After	236.40	168.12	191.44	166.46	167.50	166.98
% Change	-4.24	3.05	0	-6.38	-7.42	-6.88

Source: Primary Survey Data

6.2.7 Newly Introduced Crops in Sujala Watershed Program

As shown in table 6.7 around 29% of the beneficiary households in the study villages of Amblikoppa and Devaragudihal have introduced new crops after the initiation of Sujala Watershed Program. The inclination is higher for oil seeds and horticulture as 25% of the land under new crops is under oilseeds viz.

groundnut and soyabean followed 23% of the land under floriculture and mango. Although 26% of the land under new crops was for coconut only one farmer has taken up its cultivation.

Table-6.7
Newly Introduced Crops in Sujala Watershed Program

	Amblikoppa						Devaragudihal					
	Beneficiary		Non Beneficiary		Group Total		Beneficiary		Non Beneficiary		Group Total	
	No of HHs	Acres	No of HHs	Acres	No of HHs	Acres	No of HHs	Acres	No of HHs	Acres	No of HHs	Acres
Cereals												
Paddy	1	2	-	-	1	2	0	0	0	0	0	0
Jawar	0	0	-	-	0	0	1	1	0	0	1	1
Maize	3	6	-	-	3	6	1	6	1	1.5	2	7.5
Group Total	4	8	-	-	4	8	2	7	1	1.5	3	8.5
Oil Seeds												
Soyabean	4	9	-	-	4	9	3	8	1	1.4	4	9.4
Groundnut	3	10	-	-	3	10	3	8	1	1.5	4	9.5
Group Total	7	19	-	-	7	19	6	16	2	2.9	8	18.9
Fruits												
Jamun tree	1	1	-	-	1	2	-	-	-	-	1	2
Total	1	1	-	-	1	2	-	-	-	--	1	2
Commercial crops												
Coconut	1	20	-	-	1	20	-	-	-	-	1	20
Total	1	20	-	-	1	20	-	-	-	-	1	20
Horticulture crops												
Mango	1	0.5	-	-	1	0.5	3	5.2	-	-	4	5.7
Flower	1	0.5	-	-	1	0.5	7	10.25	-	-	8	10.75
Sapota	0	0	-	-	0	0	1	1	-	-	1	1
Group Total	2	1	-	-	2	1	13	20.45	-	-	15	21.45
Forestry Plants												
Teak	1	0.5	-	-	1	0.5	15	8.2	-	-	16	8.7
Total	1	0.5	-	-	1	0.5	13	8.2	-	-	16	8.7

Source: Primary Survey Data

Horticulture and Forestry Activities

The beneficiary and non-beneficiary respondents have resorted to planting of seedlings under horticulture and forestry activities. Maximum number of mango seedlings, have been planted in both the study villages of Amblikoppa and Devaragudihal. In Amblikoppa 34 beneficiaries of SWP planted 1382 seedlings of mango (63% of total) and 3 non-beneficiaries planted 135(6%) seedlings. Six beneficiaries planted 704 teak seedlings (32%). Other seedlings

planted by SWP beneficiaries included sapota [20(1%)], jasmine [70 (3%)], coconut (10 (0.5%) and neem [11(0.5%)]. In total 2197 seedlings were planted by 53 beneficiary farmers in Amblikoppa under horticulture and forestry activities.

In Devaragudihal maximum of 17740 (48% of total) teak seedlings were planted by 62 beneficiary farmers followed by mango [15761(42.6) planted by 64 farmers and sapota [3089 (8.9%)] planted by 25 farmers. Other seedlings planted were jasmine (0.3%), coconut (0.5%) and neem (0.5%). A total number of 37007 seedlings were planted by 161beneficiary farmers in Devaragudihal under horticultural and forestry activities. Table 6.8 given below provides the details.

Table-6.8
Seedlings Planted under Horticultural and Forestry Activities

Seedlings Planted	Amblikoppa		Devaragudihal	
	Beneficiary		Beneficiary	
	No of HHs	Seedlings	No of HHs	Seedlings
Mango	34	1382 (63%)	64	15761(42.6)
Sapota	3	20 (1%)	25	3089 (8.4)
Jasmime	2	70 (3%)	2	101 (0.3%)
Coconut	2	10 (0.5%)	6	112 (0.3%)
Neem	3	11 (0.5%)	2	204 (0.6%)
Teak	6	704 (32%)	62	17740 (47.8%)
Total	50	2197	161	37007 (100%)
Per HH	-	36	-	319

Source: Primary Survey Data

6.3 Livestock Holding

6.3.a Distribution of Households According to Livestock Holding

Livestock rearing is a part of the agricultural operations of farm families. Livestock like bullock are used in farm operations while milch animals like buffaloes and cows yield supplementary income to the farmers. The data obtained through field survey has revealed that the agricultural households covered by the study had a substantial number of cows, buffaloes, poultry and oxen. Maximum number of beneficiary and non-beneficiaries of Sujala project owned oxen followed by poultry, buffaloes and cows. A few others in Amblikoppa owned goats and a small number of households owned sheep. Totally 77% of beneficiary households and 3% of non beneficiary households in Amblikoppa have reported ownership of livestock during household survey. In Devargudihal the livestock ownership is reported by 47% of the beneficiary households, while none of the non beneficiary households own any kind of livestock. There has been an increase in ownership of livestock holding as shown by the average livestock holding before and after project period in Table 6.9 below for both beneficiaries and non beneficiaries. The number of households reporting livestock ownership of any kind has increased marginally by 15% after project period in both the villages. But, the percentage increase in livestock hoarding is significantly higher for beneficiaries than non beneficiaries.

Table-6.9

Distribution of Households According to Livestock Holding (Nos.)

Sl. No.	Livestock	Beneficiary				Non-Beneficiary			
		Amblikoppa		Devaragudihal		Amblikoppa		Devaragudihal	
		Before	After	Before	After	Before	After	Before	After
1.	Cow	37	57	56	71	5	8	27	30
2.	Buffalo	40	60	27	43	9	12	16	18
3.	Goat	25	60	1	10	0	0	0	0
4.	Sheep	0	10	50	65	0	0	1	4
5.	Ox	83	91	85	90	23	28	12	14
	Total	185	278	219	279	37	48	56	66
	Average [1-5]	**3.0**	**5.00**	**2.00**	**2.00**	**1.00**	**2.00**	**1.00**	**2.0**
6.	Poultry	43	95	41	1044	35	40	41	50

Source: Primary Survey Data

6.3.b Annual production and returns from livestock rearing

As shown in table 6.10 there is increase in annual total milk production for both beneficiaries and non-beneficiaries in Amblikoppa and Devaragudihal post project period. Although the increase in milk production during pre and post project period is significant in the case of non beneficiaries than beneficiaries, in absolute terms the average milk production per household is higher for beneficiary households in both the villages. Even the production of dung is higher and has increased over the years for beneficiary households as compared to reduction in production for non beneficiary households. It should be noted that although dung production has also gone up the change is marginal may be because of lack of management in collection of dung. Table 6.10 provides the details.

Table 6.10

Annual Produce from livestock rearing (Milk in Litre & Dung in Kg)

	Amblikoppa			Devargudihal		
	Beneficiary	Non Beneficiary	Group Total	Beneficiary	Non Beneficiary	Group Total
Milk Production (Before)	17792	1029	18821	28906	296	29202
Milk Production (After)	17990	3008	20998	57166	2324	59490
% change	1.11	192.32	11.57	97.76	685.13	1.04
Average Production	294.9	103.7	233.3	492.8	52.8	371.8
Dung Production (Before)	7789.5	1835	9624.5	12300	1550	13850
Dung Production (After)	7874.5	1727	9601.5	12451	1500	13951
% change	1.09	-5.88	-0.23	1.22	-3.22	-0.73
Average Production	127.7	63.3	106.9	106.0	35.2	86.6

Source: Primary Survey Data

Net return from milk production and sale of dung has gone up both in Amblikoppa and Devaragudihal villages in post project period while there is decline in the earnings from sale of dung for non beneficiary households in (see table 6.11for details) both the villages. In Devaragudihala, there is also reduction in average earnings from milk production for non-beneficiary households after the project period.

Table 6.11

Average annual earnings from livestock produce (Rs.)

	Amblikoppa			Devargudihal		
	Beneficiary	Non Beneficiary	Group Total	Beneficiary	Non Beneficiary	Group Total
	Net return					
Revenue from sale of Milk (Before)	652.88	401.80	978.78	875.44	670.41	1219.97
Revenue from sale of Milk (After)	914.81	515.31	1386.82	932.23	494.60	908.23
% change	40.12	28.25	41.69	6.49	-26.22	-25.55
Revenue from sale Dung (Before)	638.23	328.72	956.62	1072.29	502.45	1517.98
Revenue from sale (After)	1404.56	275.39	1838.69	1424.27	442.93	1922.39
% change	120.07	-16.22	92.22	32.83	-11.84	26.64

Source: Primary Survey Data

6.4 Labour

6.4.a Labour Used in Agricultural Activities

The study has revealed some significant trends regarding the use of labour in agricultural activities before and after the commencement of Sujala Watershed Project in the study villages.

Among the beneficiaries with land there has been a slight decrease in the share of family male and female labour and an increase in the share of hired male and female labour used in agricultural activities(see table 6.12 for details) after SWP.

Table-6.12
Total Labour Used in Agricultural Activities (man days)

Labour Used	*Before*					
	Beneficiary with Land			Non Beneficiary		
	Amblikoppa	Devaragudihal	Total	Amblikoppa	Devaragudihal	Total
Family-Men	10720 (42.5)	19870 (44.6)	30590 (43.8)	3325 (44.1)	6910 (42.0)	10235 (42.7)
Family-Women	9640 (38.2)	17650 (39.6)	27290 (39.1)	3125 (41.5)	6290 (38.2)	9415 (39.2)
Hired - Men	2193 (8.7)	2829 (6.3)	5022 (7.2)	492 (6.5)	1239 (7.5)	1731 (7.2)
Hired - Women	2690 (10.7)	4250 (9.5)	6940 (9.9)	595 (7.9)	2017 (12.3)	2612 (10.9)
Total	25243 (100.0)	44599 (100.0)	69842 (100.0)	7537 (100.0)	16456 (100.0)	23993 (100.0)

(Figures in parenthesis are percentages)

Labour Used	After					
	Beneficiary with Land			Non Beneficiary		
	Amblikoppa	Devaragudihal	Total	Amblikoppa	Devaragudihal	Total
Family-Men	10690 (41.7)	22550 (42.0)	33240 (41.9)	2445 (42.6)	4880 (41.3)	7325 (41.7)
Family-Women	9185 (35.8)	21000 (39.1)	30185 (38.0)	2375 (41.4)	4640 (39.3)	7015 (40.0)
Hired - Men	2620 (10.2)	3640 (6.8)	6260 (7.9)	401 (7.0)	1110 (9.4)	1511 (8.6)
Hired - Women	3129 (12.2)	6526 (12.1)	9655 (12.2)	520 (9.1)	1178 (10.0)	1698 (9.7)
Total	25624 (100.0)	53716 (100.0)	79340 (100.0)	5741 (100.0)	11808 (100.0)	17549 (100.0)

Source: Primary Survey Data

6.4.b Average Annual man days of Work in agriculture

As shown in table 6.13 there has been an increase in the average annual man days of work per household among beneficiaries with and without land in both Amblikoppa and Devaragudihal after SWP. In Amblikoppa the increase in annual average man days per household was marginal by 1.3% while in Devaragudihal there was an increase in average mandays of work by 20% for beneficiaries after SWP.

For non-beneficiaries of SWP there has been a decline in the average annual man days of work by 24% in Amblikoppa and by 29% in Devaragudihal after implementation of Sujala Watershed Project in the study areas. The increase in the average annual man days of work may be attributed to the increased agricultural activities due to Sujala project.

Table-6.13

Average Annual Man days of Work per beneficiary and non beneficiary

	Beneficiary with Land		Non Beneficiary with land	
	Amblikoppa	Devaragudihal	Amblikoppa	Devaragudihal
Before	159	160	87	125
After	161	192	66	89
% Change	1.3	20.0	-24.0	-28.8

Source: Primary Survey Data

6.4.c Number of Days of Gainful Employment for Landless Under SWP

There has been an increase of number of days of gainful employment for landless beneficiaries by 37% in Amblikoppa and by 41% in Devaragudihal after the start of Sujala Watershed Project. For the non-beneficiaries without land also there has been an increase in the number of days of gainful employment by 5% in Amblikoppa and by 12% in Devaragudihal. Thus the positive employment impact of the SWP is vindicated in case of landless workers in the study areas. Table 6.14 provides the details. The figures indicate positive impact of increased

on farm and off farm activities on employment in both the micro watershed villages.

Table-6.14
Average Days of Gainful Employment for Landless in Sujala Watershed Project villages

	Land Less Beneficiary			Land Less Non Beneficiary		
	Amblikoppa	**Devaragudihal**	**Total**	**Amblikoppa**	**Devaragudihal**	**Total**
Before	114	196	175	196	219	211
After	156	277	246	206	246	231
% Change	36.84	41.32	40.6	5.1	12.33	9.5

Source: Primary Survey Data

6.4.d Additional Employment Gained Due to SWP

The findings suggest generation of additional employment due to SWP in both Amblikoppa and Devaragudihal. In Amblikoppa, additional employment gained by both beneficiaries and non-beneficiaries due to SWP averaged 36.62 days in agricultural operations. It was higher at 38.71 days for beneficiaries compared to 32.86 days for non-beneficiaries. In non-agricultural activities the average additional employment gained due to SWP in Amblikoppa was 12.84 days. It was higher at 21.43 days for non-beneficiaries compared to 9.43 days for beneficiaries.

In Devaragudihal additional employment gained in agriculture averaged 25 days together for beneficiaries and non-beneficiaries. The gain of additional employment for beneficiaries was higher at 29 days compared to 10 days for non-beneficiaries. In non-agricultural sector additional employment gained due to SWP was 5 days. It was higher at 8 days for non-beneficiaries compared to 4 days for beneficiaries. The following chart (Fig.1) and table (6.15) provide the details.

Fig.6.1 Additional employment gained due to SWP (No of mandays)

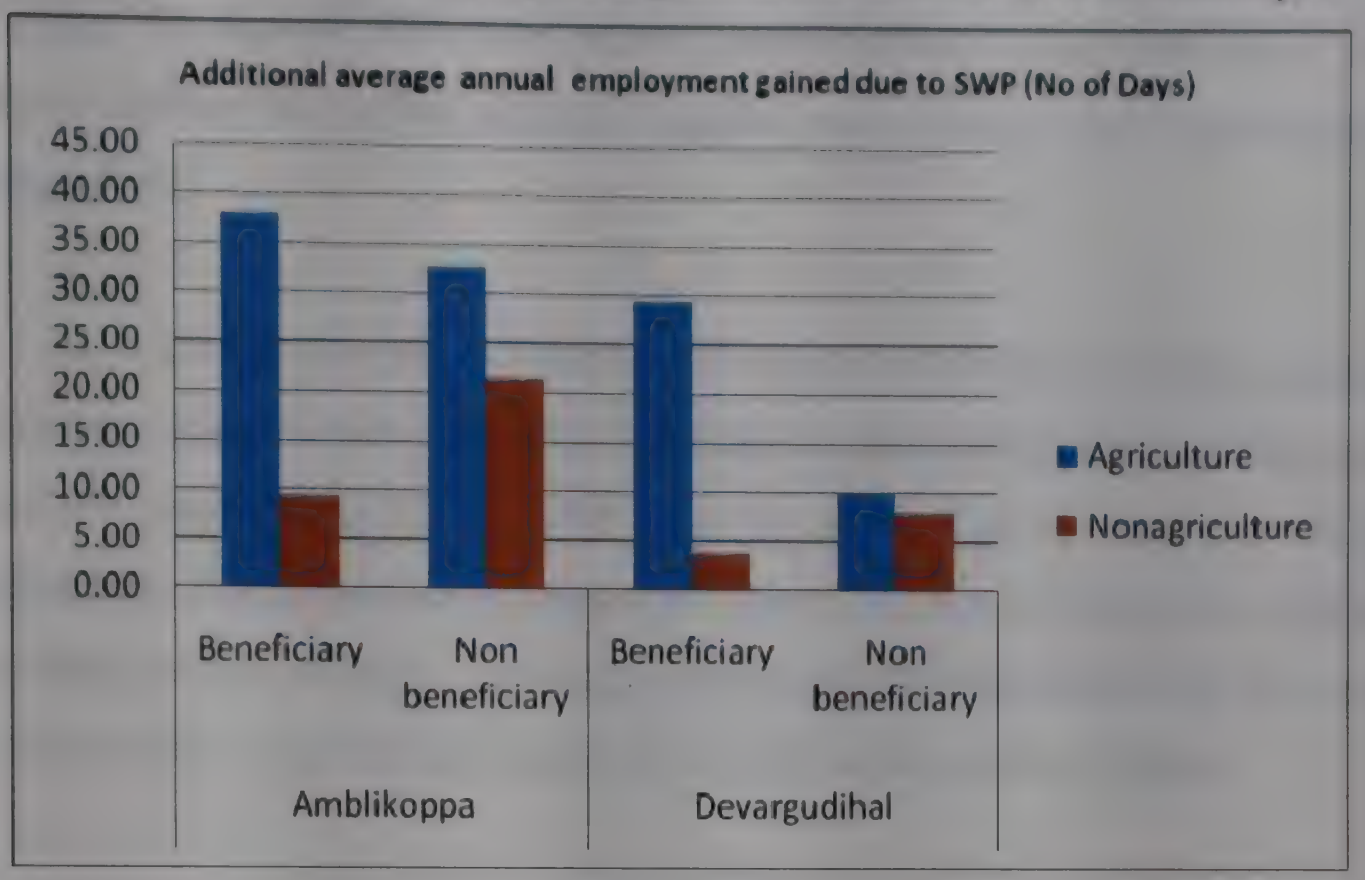


Table-6.15

Additional Employment Gained Due to SWP (man days)

	Amblikoppa			Devaragudihal		
	Beneficiary	**Non beneficiary**	**Total**	**Beneficiary**	**Non beneficiary**	**Total**
Agriculture	38.11	32.86	36.62	29	10	25
Non agriculture	9.43	21.43	12.84	4	8	5
Average employment gained	48	54	49	33	18	30

Source: Primary Survey Data

6.5 Migration

6.5.a Number of Days Migrated in Search of Employment

The study has revealed some contrasting trends regarding the number of days migrated in search of employment in between the two villages of Amblikoppa and Devaragudihal. In Amblikoppa there is an increase in the number of days migrated in search of employment for beneficiaries with land from 280 days to 530 days and for beneficiaries without land from 60 days to 120

days. But, in Devaragudihal there is decline in the number of days migrated in search of employment among beneficiaries with land from 1540 days to 930 days and from 360 days to 330 days among beneficiaries without land after SWP. There is decline in number of days migrated even among non beneficiaries in Devargudihal.

In Amblikoppa although there is no decline in number of days migrated among beneficiaries, there has been a decline in the number of days migrated in search of employment from 1960 days to 1440 days in the case of non beneficiaries. The details are provided in Table 6.16. Non beneficiaries appear to have taken benefit of Sujala activities particularly land development, farm pond and plantations, which create employment opportunities in the village.

Table-6.16
Total Number of Days Migrated in Search of Employment

	Beneficiary with Land			Beneficiary Land Less			Non Beneficiary		
	Ambli koppa	Devar agudihal	Total	Amblik oppa	Devara gudihal	Total	Ambli koppa	Devara gudihal	Total
Before	280	1540	1820	60	360	420	1960	1320	3280
After	530	930	1460	120	330	450	1440	690	2130
% Change	89.2	-39.6	-19.78	100	-8.33	7.14	-26.53	-47.72	-35.06

Source: Primary Survey Data

6.6 Wage Rates

6.6.1 Average Wage Rates in Sujala Watershed Project Villages

The wage rates in the Sujala Watershed project villages have gone up after the commencement of the project. The project being sponsored through the government had adhered to the minimum wages fixed under the Minimum Wages Act and the rates fixed under the Mahatma Gandhi National Rural Employment Guarantee Act. The wage rates of both male and female workers

have gone up both in Amblikoppa and Devaragudihal after the commencement of the project. The wage rate for male workers went up from Rs. 98.41 per day to Rs. 169.81 after completion of Sujala project. Similarly the male wage rate in Devaragudihal went from Rs. 91.96 to Rs. 160.70. The average wage rate in the two villages went up from Rs. 94.97 to Rs. 164.65 during the period (by 73%). Similarly female wage rates in Amblikoppa and Devaragudihal went up from Rs. 51.18 to Rs. 106.65 and from Rs. 47.34 to Rs. 97.18 respectively after implementation of the Sujala project (by 106%). The average female wage rate went up from Rs. 48.75 to Rs. 100.17 in the two villages during the period. Thus Sujala Watershed project has led to a rise in wages of the labour in the study area. In real terms the wage rates have increased by more than 70% for male and doubled for female workers during three years of project period. Table 6.17 provides the details.

Table-6.17
Average Wage Rate in Sujala Watershed Project Villages

(Rs. in Current Prices)

Period	Male			Female		
	Amblikoppa	Devaragudihal	Total	Amblikoppa	Devaragudihal	Total
Before	98.41	92.96	94.97	51.18	47.34	48.75
After	169.81	160.7	164.09	106.65	97.18	100.71
% Change	72.55	72.85	72.76	108.39	105.30	106.61

(Rs. in Constant Prices)

Period	Male			Female		
	Amblikoppa	Devaragudihal	Total	Amblikoppa	Devaragudihal	Total
Before	62.28	58.84	60.11	32.39	29.96	30.85
After	107.47	101.71	103.85	67.50	61.51	63.74
% Change	72.55	72.85	72.76	108.39	105.30	106.61

Source: Handbook on Indian Economy, RBI Publication
Base=100=2004-2005 GDP deflator

6.7 Training for Self Employment and Support Activities

6.7.a Training

Training in tailoring, dairy and other self employment and support activities have been availed by beneficiary households in the two study villages under SWP. Tailoring accounts for 22%, dairy for 27% and other activities constitute 51% for which beneficiaries received training (see table 6.18).

Table-6.18
Training for Self Employment and Support Activities (No of HHs)

Training	Beneficiary		
	Amblikoppa	Devaragudihal	Total
Tailoring	6	5	11
Dairy	8	5	13
Others	10	15	25
Total	24	25	49

Source: Primary Survey Data

6.7.b Support Given by the Organization After Training

As shown in table 6.19 training under Sujala project organization is subsequently supported by financial help according to project beneficiaries in Amblikoppa and Devaragudihal. All most all of those who received training have received support in terms of finance, supply of raw materials and market facility after impartment of training.

Table-6.19
Support Given by the Organization After Training (No of HHs)

Category	Beneficiary		
	Amblikoppa	Devaragudihal	Total
Financial support	7	18	25
Supply of raw materials	11	11	22
Marketing facility	5	3	8
Total	23	32	55

Source: Primary Survey Data

Marketing of their products was not a problem for ninety percent of the beneficiaries in project area as the products manufactured by the beneficiaries are largely limited to local and taluk market. Beneficiaries in Amblikoppa (around 86%) sold their produce in the villages whereas beneficiaries in Devargudihal (100%) sold their produce in taluk market.

6.7.c Benefits of Self Employment Training

Self employment training has been a component of the Sujala Watershed Projects initiated by the State Government with the financial assistance from the World Bank. This training is particularly useful for small and marginal farmers and for landless rural workers. The impact of training for self employment has been assessed by way of obtaining responses of the beneficiaries and non-beneficiaries of the Sujala Watershed Project on this issue.

As shown in table 6.20 seventy seven percent of those who received training for self employment in Amblikoppa revealed that SWP training has helped them to earn higher income while in Devargudihal 70% of those who received training felt that it helped them in getting higher income.

Table-6.20
Satisfaction over Self Employment Training under SWP (No of HHs)

	Beneficiary		
	Amblikoppa	**Devaragudihal**	**Total**
Satisfactory	18	22	40
Cannot Say	-	2	2
Total	18	24	42

Source: Primary Survey Data

6.8 Household Asset holdings

6.8.a Distribution of Households According to possession of Household Assets

Possession of household assets indicates the living standard of the families. Families in rural areas are largely deprived of modern household facilities due to poverty and ignorance of such facilities. Absence of supply centres of such facilities and low income levels may also contribute to such low living standards.

The study has revealed that there has been a perceptible improvement in the possession of the household assets by the respondent households in the study villages of Amblikoppa and Devaragudihal over a period of three years as revealed by per household asset value before and after the project period. Since number of assets cannot be compared because of the variations in their value we estimated the value of assets to make a comparison before and after and between beneficiary and non beneficiary households. The number of households possessing TV/VCD has gone up both in Amblikoppa and Devaragudihal after the commencement of Sujala Watershed Project. It is observed both among the beneficiary households and non-beneficiary households. Total number of TV/VCD increased from 23 to 35(52%) in Amblikoppa and from 45 to 83 (84%) in Devaragudihal. A negligible number of beneficiary and non-beneficiary households possessed other assets like land phone, sewing machine, washing machine, etc, which are still not at the reach of beneficiary households. The increase in average asset holding is slightly higher for beneficiary households than for non beneficiary households. Table 6.21 provides the details.

Table-6.21

Distribution of Households According to possession of Household Assets

Household Assets	Beneficiary				Non-beneficiary			
	Amblikoppa		Devaragudihal		Amblikoppa		Devaragudihal	
	Before	After	Before	After	Before	After	Before	After
TV/VCD	23	35	45	83	8	10	38	45
Music system	1	4	1	2	0	0	0	0
Gas stove	0	1	0	0	1	2	0	0
Electric Burner	0	0	0	1	0	0	1	2
Steel cupboards	6	30	5	47	4	6	7	10
Freezer	1	1	0	1	0	0	0	0
Bi-cycle	7	8	14	19	5	18	17	50
Two wheeler	2	9	10	30	1	6	9	25
Cable / DTH	13	28	27	64	2	6	30	40
Computer	0	0	0	1	0	0	2	10
Mobile phone	15	50	25	93	19	40	38	70
Land phone	3	7	1	5	5	5	5	8
Sewing machine	3	6	5	12	3	12	5	20
Washing machine	1	1	0	1	0	0	0	0
Total	76	180	133	359	48	105	152	282
Average asset holding per HH	**1.25**	**2.95**	**1.15**	**3.12**	**1.72**	**3.4**	**2.08**	**3.86**
Average value of assets (Rs.)	**6147**	**24361**	**7491**	**31198**	**6758**	**18931**	**21409**	**40000**
Change in value (%)	-	**296.0**	-	**316.0**	-	**180**	-	**87.0**

Source: Primary Survey Data

6.8.b Distribution of Households According to Agricultural Asset Holding

The agricultural progress is indicated by the type of agricultural assets held by farmers. Indian farmers still stick to their traditional implements for their agricultural operations. This results in lower agricultural productivity and low income.

The study has revealed that majority of the farm households covered by the study have not possessed modern implements for their agricultural operations. Many of them did not possess implements like power tillers, cultivators, levelers, tractors, duster, pumpsets, etc. Wooden plough is possessed by maximum number of households among the beneficiaries of Sujala watershed project and non-beneficiaries covered by the study. A good number of them possessed iron plough, seed drill, bullock cart and sprayers. Thus the respondent householder belonging to the beneficiary and non-beneficiary groups under 'Sujala' watershed projects have not gone in for modern agricultural assets which are essential for improving their agricultural productivity except in Devargudihal where ownership of tractors have almost doubled among beneficiaries replacing bullock carts. This sudden rise in Devargudihal is on account of sale of agricultural land in Devargudihal, which brought in additional flow of resources to purchase tractor. So the increase in the value of assets as shown in Table 6.22 is higher for non beneficiaries by 92% after project period. Average asset holding is higher among beneficiaries than non beneficiary households and the increase in number of agricultural asset holding is slightly higher among beneficiaries (see table 6.22 for details).

Table-6.22
Distribution of Households According to Agricultural Assets Holding

Agricultural Assets	Beneficiary				Non-beneficiary			
	Amblikoppa		Devaragudihal		Amblikoppa		Devaragudihal	
	Before	After	Before	After	Before	After	Before	After
Iron plough	10	11	29	38	4	4	5	6
Wooden plough	54	54	58	58	15	14	16	16
Seed drill	29	30	5	5	4	4	6	6
Bullock cart	23	26	24	17	2	2	4	4
Power tillers	2	2	1	0	0	0	1	1
Cultivators	7	8	14	19	1	1	9	9
Levelers	2	4	0	2	0	0	1	1
Tractor	4	7	8	16	0	0	2	4
Sprayer	10	11	13	16	1	1	1	1
Duster	0	0	1	1	0	0	0	0
Pumpset	8	10	8	8	0	0	1	2
Total	149	163	161	180	27	28	46	50
Average asset holding per HH	2.44	2.67	1.38	1.55	0.93	0.96	1.05	1.13
Average value of Assets (Rs.)	41842.0	67302.0	28371.0	47456.0	969.0	934.0	15377.0	29517.0
Change (%)	-	61.0	-	67.0	-	-4.0.	-	92.0

Source: Primary Survey Data

6.9 Annual Income of Households Before and After Implementation of Sujala Watershed Project

6.9.a Average income in current Prices: There has been substantial change in the annual income of households belonging to different occupations after the implementation of Sujala watershed project in the two study villages of Amblikoppa and Devaragudihal in Dharwad district (in current prices) as presented in table 6.23.

In Amblikoppa the annual income of beneficiaries from agriculture has gone up by 72% from Rs. 1740000 to Rs. 2996000 during project period. The annual income from allied activities of 28 households has almost doubled from Rs. 159970 to Rs. 319750. A substantial increase in business income has taken place after the start of the SWP in the village along with an increase in the number of households involved in business. Agricultural wages have increased considerably along with significant rise in non-agricultural wages. There has been growth of salaried employment and income in the village subsequent to implementation of SWP.

The annual income of non-beneficiaries in Amblikoppa has indicated a general trend of decline in different occupations like agriculture, allied activities and non-agricultural wages. However there is a increase in agricultural wages of non-beneficiaries subsequent to the start of the SWP in the study village of Amblikoppa.

It is significant to find from the field survey that the total income of the beneficiary respondents has increased substantially after the starting of SWP, while the total income of non-beneficiaries has declined during the corresponding period.

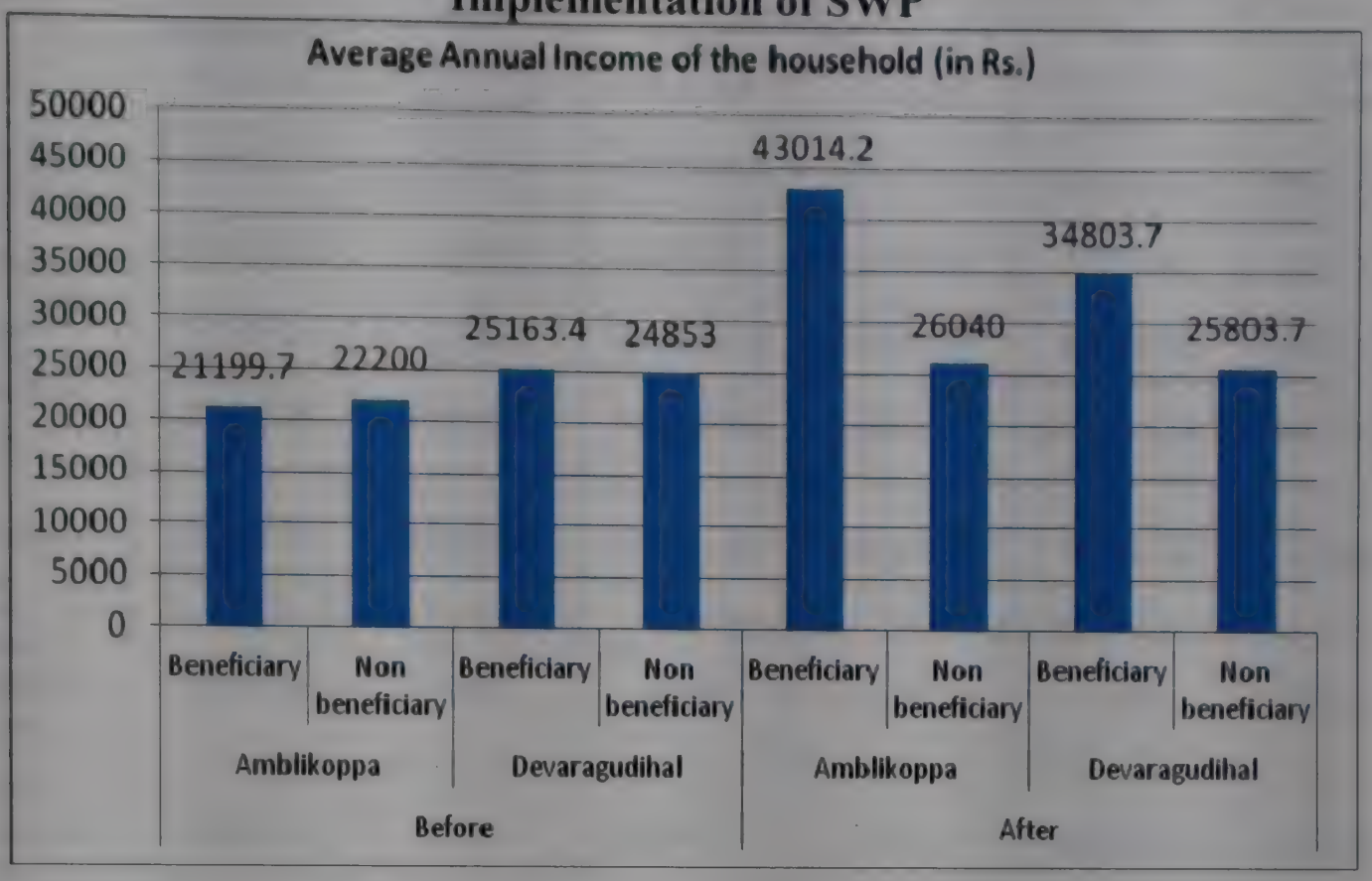
In Devaragudihal the annual income of respondents belonging to different occupations shows some divergent trends compared to the income position of respondents in Amblikoppa. There is an increase in annual income of beneficiary respondents belonging to different occupations after the start of SWP. The annual income of non-beneficiary respondents has indicated a trend of decline in different occupational groups except of those belonging to allied activities, whose income has increased after the starting of SWP (see table 6.29 and Fig. 3 for details).

Table-6.23
Annual Income of Households Before and After Implementation of Sujala Watershed Project (Rs.)

	Before					
	Amblikoppa3			Devaragudihal		
	Beneficiary	Non Beneficiary	Total	Beneficiary	Non Beneficiary	Total
	Amount	Amount	Amount	Amount	Amount	Amount
Agriculture	1740000	559500	2299500	3347300	534300	3881600
Allied activities	159970	9800	169770	261970	19820	281790
Business	240000	6000	246000	160000	216600	376600
Agriculture wages	169100	185500	354600	541610	579150	1120760
Non-agricultural wages	86500	253000	339500	109000	76000	185000
Salaried employment in private	0	0	0	0	0	0
Salaried employment in govt.	0	74000	74000	0	60000	60000
Others	0	0	0	688300	229000	917300
Total	2395570	1087800	3483370	5108180	1714870	6823050
Average	**21199.73**	**22200.00**	**21502.28**	**25163.40**	**24853.20**	**25084.70**
After						
Agriculture	2996000	407000	3403000	4098000	414000	4512000
Allied activities	319750	48600	368350	456140	24960	481100
Business	365200	0	365200	638000	105000	743000
Agriculture wages	349000	219800	568800	1145560	424600	1570160
Non-agricultural wages	242400	236000	478400	240200	51000	291200
Salaried employment in private	114000	0	0	0	0	114000
Salaried employment in govt.	100000	0	100000	0	90000	90000
Others	2008800	0	2008800	0	0	0
Total	6495150	911400	7292550	6577900	1109560	7801460
Average	**43014.24**	**26040.00**	**39633.42**	**34803.70**	**25803.70**	**33339.60**

Source: Primary Survey Data

Fig.6.2 Average annual Income of Households Before and After Implementation of SWP



6.9.b Annual income of households in constant prices

The annual income of beneficiary respondents covered by the SWP in Amblikoppa is higher than the annual income of non-beneficiary respondents belonging to different occupations viz. agriculture, allied activities, business, agricultural labour and non-agricultural labour. However, the increase in income after SWP is not realized in real terms for beneficiaries in Devargudihal although beneficiaries have earned higher income in current prices in the year after the project completion. As shown in table 6.24 the annual income in real terms (constant) falls short by 12% for beneficiaries and by 34% for non beneficiaries in Devargudihal as compared to their pre project income in current prices.

Table-6.24
Annual Income of Households in Constant Prices (Rs.)

	Amblikoppa			Devaragudihal		
	Beneficiary Amount	**Non beneficiary Amount**	**Total Amount**	**Beneficiary Amount**	**Non beneficiary Amount**	**Total Amount**
Agriculture	1896202.53	257594.94	2153797.47	2593670.89	262025.32	2855696.20
Allied activities	202373.42	30759.49	233132.91	288696.20	15797.47	304493.67
Business	231139.24	0.00	231139.24	403797.47	66455.70	470253.16
Agriculture wages	220886.08	139113.92	360000.00	725037.97	268734.18	993772.15
Non-agricultural wages	153417.72	149367.09	302784.81	152025.32	32278.48	184303.80
Salaried employment in private	72151.90	0.00	0.00	0.00	0.00	72151.90
Salaried employment in govt.	63291.14	0.00	63291.14	0.00	56962.03	56962.03
Others	1271392.41	0.00	1271392.41	0.00	0.00	0.00
Total	4110854.43	576835.44	4615537.97	4163227.85	702253.16	4937632.91
Average Income	27224.20	16481.01	25084.45	22027.66	16331.47	21101.00
Change after SWP	**28%**	**-26%**	**16.6%**	**-12.46%**	**-34%**	**-15.88%**

Source: Handbook of statistics of Indian Economy
Base=100=2004-2005 using GDP deflator

6.9.c Total Annual Income of SWP Beneficiaries and Non-beneficiaries

The field survey in Amblikoppa villages covered by the study has revealed that the share of respondent beneficiary households in higher income groups has increased after project period. As shown in Table 6.25 15% of beneficiary households in Amblikoppa and 7% of the beneficiary households in Devargudihal have moved out of poverty line. Among the non-beneficiaries the number of households in the lower income group of Rs. <18,000 has gone up while in the next higher income group the number of households has declined. The households below poverty line has increased among non beneficiary households both in Amblikoppa and Devargudihal by 7% and 23% respectively indicating non availability of income support activities in comparison to beneficiary households. Table 6.25 shown below provides further details.

Table-6.25
Distribution of HHs according Income groups (Annual)

Income Group (Rs.)	Before											
	Amblikoppa						Devaragudihal					
	Beneficiary		Non Beneficiary		Group Total		Beneficiary		Non Beneficiary		Group Total	
	No of HHs	Share (%)	No of HHs	Share (%)	No of HHs	Share (%)	No of HHs	Share (%)	No of HHs	Share (%)	No of HHs	Share (%)
<=18000	19	31.15	11	37.93	30	33.33	36	31.03	14	31.82	50	31.25
18001-50000	33	54.10	10	34.48	43	47.78	45	38.79	20	45.45	65	40.63
50001-100000	7	11.48	6	20.69	13	14.44	23	19.83	7	15.91	30	18.75
100000-200000	1	1.64	2	6.90	3	3.33	10	8.62	3	6.82	13	8.13
>200000	1	1.64	0	0.00	1	1.11	2	1.72	0	0.00	2	1.25
Group Total	61	100.00	29	100.00	90	100.00	116	100.00	44	100.00	160	100.00

After

Income Group	No of HHs	Share (%)	No of HHs	Share (%)	No of HHs	Share (%)	No of HHs	Share (%)	No of HHs	Share (%)	No of HHs	Share (%)
<=18000	10	16.39	13	44.83	23	25.56	28	24.14	24	54.55	52	32.50
18001-50000	21	34.43	9	31.03	30	33.33	22	18.97	11	25.00	33	20.63
50001-100000	18	29.51	4	13.79	22	24.44	45	38.79	9	20.45	54	33.75
100000-200000	10	16.39	3	10.34	13	14.44	14	12.07	0	0.00	14	8.75
>200000	2	3.28	0	0.00	2	2.22	7	6.03	0	0.00	7	4.38
Group Total	61	100.00	29	100.00	90	100.00	116	100.00	44	100.00	160	100.00

Source: Primary Survey Data

6.10 Household Credit Position of Beneficiary / Non-Beneficiary households

The loan position of the beneficiary and non-beneficiary households covered by the 'Sujala' project indicate that the respondent beneficiaries in Amblikoppa have obtained more credit for house constructions (57%) followed by loans for agriculture, education, domestic purpose and health expenditure. Among the non-beneficiaries higher credit was obtained for domestic purpose (36%) followed by loans for health expenditure and agriculture.

In Devaragudihal beneficiary respondents borrowed higher loans for purchase of vehicles (74%) followed by loans for agriculture, construction of

house, domestic expenditure and health expenditure. Among the non-beneficiaries higher amount of loan was borrowed for agriculture (41%) followed by loans for education, domestic purpose and construction of house. Asset building among beneficiaries seems to be higher in terms of ownership of houses and vehicles. The average credit availability is also higher for beneficiaries than non beneficiaries. This shows the higher credit absorbing capacity of beneficiary households as compared to non - beneficiary households. The details of household credit position are provided in table 6.26.

Table-6.26
Household Credit Position of Beneficiary/Non-Beneficiary Respondents

(Rs.)

	Amblikoppa		Devaragudihal	
	Beneficiary	Non Beneficiary	Beneficiary	Non Beneficiary
Agriculture	42410	20000	71840	31667
Construction of house	115000	0	24700	11667
Purchase of vehicle	0	0	315000	0
Health	10000	25000	5000	0
Domestic purpose	13188	25700	10280	14000
Education	20000	0	0	20000
Total	200598	70700	426820	77334
Average credit per HH	**3288**	**2438**	**3679**	**1758**
Percentage share of credit according to purpose of loan (%)				
Agriculture	21	28	17	41
Construction of house	57	0	6	15
Purchase of vehicle	0	0	74	0
Health	5	35	1	0
Domestic purpose	7	36	2	18
Education	10	0	0	26
Total	100	100	100	100

Source: Primary Survey Data

6.11 Household Savings of Sujala Watershed Beneficiaries and Non-beneficiaries

The study has revealed that the total **cumulative** savings of beneficiaries with land in Amblikoppapa and Devatgudihal as on the date of the survey were the maximum with Bank (40% in Amblikoppa and 52% in Devargudihal) followed by savings in LIC (40% in Amblikoppa and 29% in Devargudihal), SHG (10% both in Amblikoppa and Devargudihal), Fixed deposit (9% both in Amblikoppa and Devargudihal) and RD savings (1% both in Amblikoppa and Devargudihal) as shown in table 6.27. Similar pattern of savings has been observed for non beneficiaries, whereas landless beneficiaries have savings only with LIC and SHGs. Average cumulative savings per household as on date were the highest for beneficiary households in both the villages at Rs. 11365, followed by Rs. 4272 for non beneficiaries and Rs.3072 for landless beneficiaries. The above figures reveal that beneficiary households are able to accumulate higher savings as compared to non beneficiaries over a period of three to four years.

Table-6.27

Total Cumulative Savings of Beneficiaries and Non-beneficiaries of SWP (Rs.)

	Total Cumulative Savings								
	Beneficiary with Land			Land Less Beneficiary			Non Beneficiary		
	Amblikoppa	Devargudihal	Total	Amblikoppa	Devargudihal	Total	Amblikoppa	Devargudihal	Total
Source	Amount	Amount	Amount	Amount	Amount	Amount	Amount	Amount	Amount
Bank (SB A/C)	230000	564000	794000	200	-	200	130000	20000	150000
RD	7200	10000	17200	-	-	-	-	-	-
FD	50000	96000	146000	10500	-	10500	-	-	-
Post office	-	-	-	6000	-	6000	-	-	-
LIC	229848	314600	544448	10500	41450	51950	47900	12000	59900
SHG	54680	102900	157580	7725	29200	36925	48660	53320	101980
Total	571728	1087500	1659228	34925	70650	105575	226560	85320	311880
Average per HH	10787	11694	11365	4366	3072	3406	7812	1939	4272

Source: Primary Survey Data

6.12 Benefits from 'Sujala' Watershed Project

The benefits of the 'Sujala' watershed project can be grouped under two main components viz. direct project benefits and indirect benefits i.e benefits due to SWP as perceived by the community. Direct benefits include technological improvement in farm management, improved production practices, horticulture development and forestry. Indirect benefits include perceived monetary benefits including higher income, wage increases, credit facilities, etc, and physical benefits like increase in water level, soil moisture, etc.

Under the technological benefits, majority of beneficiaries of SWP have received assistance for construction of earthen bunds (27%), farm pond (14%), recharge pits (17%) and land leveling (10%). Tables 6.28 and 6.29 provide the details of benefits of SWP as availed and perceived by beneficiaries.

Training awareness and guidance under the SWP followed by integrated pest management, inter-cultivation and cultivation across the slope have benefited good number of beneficiaries relating to improved production practices. Under horticulture, assistance is given only in terms of supply of seedlings for planting. It has been the last preference of beneficiaries accounting for 16% of total cumulative direct benefits.

Table-6.28 - Benefits of Sujala Watershed Project

I. Direct Benefits

Technological Benefits (%)	**Amblikoppa**	**Devaragudihal**	**Total Beneficiaries**
Earthen bunds	31.7	15.8	26.6
Boulder bunds (rock bunds)	4.2	0	2.8
Vegetative cover	9.2	1.8	6.8
Farm pond	14.2	14	14.1
Check dam	7.5	5.3	6.8
Gokatte repairs	8.3	7	7.9
Diversion canal	6.7	3.5	5.6
Land leveling	10	8.8	9.6
Recharge pit	6.7	38.6	16.9
Others (specify)	1.7	5.3	2.8
Total	100	100	100
Improved production practices (%)			
Training, awareness and guidance	34.7	50.3	43.8
Integrated Pest Management (IPM)	24	17.8	20.3
Cultivation across the slope	24	8.3	14.8
Inter cultivation	17.4	23.7	21
Total	100	100	100
Horticulture (%)			
Seedlings for planting	100	100	100
Forestry (%)			
Seedlings for planting	72.1	67	68.5
Joint Forest Management (JFM)	27.9	33	31.5
Total	100	100	100
II. Indirect benefits			
2.1 Economic Benefits (%)			
Increase in household agricultural income	10.3	9	9.5
Increase in wage rates (for landless labour)	10.5	10.4	10.5
Increase in income from non agricultural activities	10.3	9.1	9.5
Employment opportunities to self and family members	9	9.8	9.5
Diversification of crops (from food to cash crops)	7.3	7.8	7.6
Increase in agricultural yield due to SWP	13.8	13.9	12.9
Increase in cultivated area	4.2	5	4.7
Increase in credit facilities	12.6	12	12.1
Trying new watershed management practice	2.9	2.8	2.8
Water availability at right time due to SWP	6.8	6.9	6.9
Water delivery structures are properly maintained under SWP	11.4	13.3	12.6
Total	100	100	100
2.2 Physical Benefits (%)			
Ground water recharge due to SWP	53.52	54.43	54
Control of flood risks due to SWP	46.48	45.57	46
Total	100	100	100

Source : Primary Survey Data

The overall responses about the benefits of SWP in the study villages indicate high percentage of frequency responses for improved production practices (39%), technological benefits (25%), forestry (20%) and horticulture (16%) among direct benefits (see Fig. 2). Among indirect benefits the share of economic benefits was higher (89.6%) as beneficiaries reported increase in household agricultural income, increase in wages, employment opportunities, diversification of crops, higher agricultural yield, increased credit facilities, etc, due to implementation of SWP.

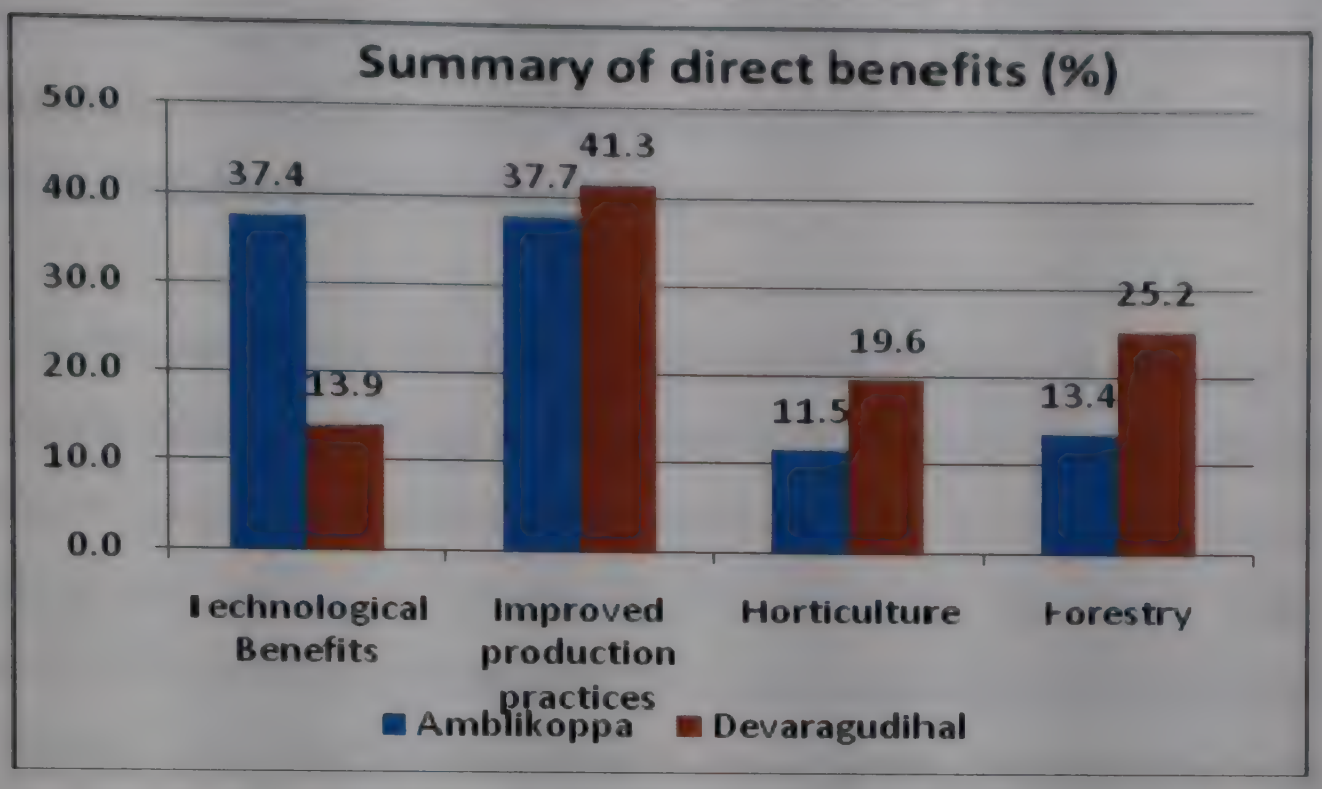
On an average each beneficiary household has experienced ten perceived indirect benefits in Amblikoppa and Devargudihal (see table 6.29).

Table 6.29
Summary of direct and indirect Benefits

Summary of Benefits	Amblikoppa		Devaragudihal		Total Beneficiaries	
	HHs	%	HHs	%	HHs	%
1.Direct Benefits						
Technological Benefits	120	37.0	57	14.0	177	25
Improved production practices	121	38.0	169	41.0	290	39
Horticulture	37	12.0	80	19.0	117	16
Forestry	43	13.0	103	25.0	146	20
Total	321	100.0	409	100.0	730	100.0
2. Indirect benefits						
Economic Benefits	455	86.5	835	91.0	1290	89.6
Physical Benefits	71	13.5	79	9.0	150	10.4
Total	**526**	**100.0**	**914**	**100.0**	**1440**	**100.0**
Average indirect benefits per HH (Nos.)	**10**		**10**		**10**	

Source: Primary Survey Data

Fig. 6.3 Direct benefits from SWP



Positive impact of Sujala Watershed Project in the two study villages is apparent from the above findings. Hence there is need for further extension of the project in other rainfed and draught prone areas in other parts of the state. In addition to reporting of benefits accrued from the Sujala Watershed Project implementation, around 6% of responses indicate the following drawbacks due to implementation of the project viz;

i. problem of water logging due to SWP.

ii. problem of sanitation due to SWP.

iii. excessive withdrawal of groundwater due to SWP.

Since the NGOs or agencies involved in the implementation of the Sujala Watershed Project have moved out of project area after completion of project, it would be the duty of area groups or watershed committees to look into these issues and intervene to settle the problem.

6.13 Overall implications of SWP on poverty status

It is very difficult to link any single development project directly to changes in the living standard and economic status of households as other factors like infrastructure, education, changing preferences over the period can also have their influences. In the context of this study therefore the researcher has tried to

place a comparative analysis of beneficiary and non beneficiary households located in similar geographic and social conditions for finding the impact of SWP on economic status of the households before and after project period and between beneficiary and non beneficiary households.

In the paragraphs below we summarize the findings of the study drawn from the discussions presented in the earlier sections of this chapter with specific reference to indicators that directly or indirectly have a bearing on poverty. In explaining the impact on poverty the researcher has considered firstly the standard of living index developed for this study purpose considering the size of land holding both total agricultural land and irrigated land, type of house and nature of ownership, ownership of durable goods and agricultural goods, ownership of livestock, annual household income, source of drinking water (piped water supply or not), availability of individual toilet facility, type of fuel used, separate kitchen and drainage facility. Since all the households have electric connection it has not been taken as an indicator. Secondly, the percentage of households moving out of poverty line in terms of annual household income (Rs. 18,000 p.a. is taken as cut off point for considering households below poverty line on the basis of threshold limit considered by Govt. of Karnataka for identifying beneficiaries under government welfare programmes) is taken as one of the indicators of linkage with SWP. Other indicators include migration status, changes in wage rates, agricultural yield, employment, availability of credit through SHGs and other sources, average cumulative savings, etc.

- To make a comparative analysis of the economic status of households between beneficiaries and non beneficiaries, we grouped the households in to low, middle and high category groups according to their standard of living. Households were grouped in to these categories by constructing Standard of Living Index (SLI) on the basis of the indicators discussed above by giving scores from 0 to 4 as per the methodology adopted by NFHS (IIPS, 2000). The SLI scores range from 6 in low category to 47 in high category

households. Table 6.30 indicates that majority of the households belong to low level of economic status. But, when we grouped the households in to beneficiary and non beneficiary households we find that in Amblikoppa of the total households 50% of beneficiary households belong to low SLI category, while the percentage of households belonging to low SLI is higher (76%) among non beneficiary households. Similar is the case with Devargudihal where the percentage of households belonging to low SLI is higher among non beneficiaries (80%).

Table 6.30: Distribution of Households according to Standard of Living Index or level of economic status

Standard of Living Index	**Amblikoppa**		**Devargudihal**	
	Beneficiary household	Non-Beneficiary household	Beneficiary household	Non-Beneficiary household
Low	31(50%)	22 (76%)	50(43%)	35(80%)
Medium	28 (47%)	7(24%)	59(51%)	9 (20%)
High	2 (3%)	--	7 (6%)	--
Group Total	**61 (100%)**	**29 (100%)**	**116 (100%)**	**44 (100%)**

Source : Primary Survey Data

- There has been an increase in agricultural yield as discussed in section 6.2.3 for beneficiary households, particularly in summer in both the villages.
- The number of households reporting livestock ownership of any kind has increased marginally by 15% after the project period in both the villages. But, the percentage increase in livestock hoarding is significantly higher for beneficiaries than non beneficiaries.
- Average milk production per household is higher for beneficiary households in both the villages. Even the production of dung is higher and has increased over the years for beneficiary households as compared to reduction in production for non beneficiary households.

- Net return from milk production and sale of dung has gone up in both the villages(120% in Amblikoppa and by 33% in Devargudihal) in post project period while there is decline in the earnings from sale of dung for non beneficiary households
- Among the beneficiaries with land there has been a slight increase in the share of hired male and female labour used in agricultural activities. There has been an increase in the average annual man days of work (table 6.13) per household among beneficiaries with and without land in both the villages after SWP.
- Landless beneficiaries in both the villages have benefitted largely as there is increase in employment by 17% in Amblikoppa and by 22% in Devargudihal for these households. Thus the positive employment impact of the SWP is vindicated in case of landless workers in the study areas.
- Non beneficiaries also to have taken benefit of Sujala activities particularly land development, farm pond and plantations, which create employment opportunities in the village.
- SWP has led to a rise in wages of the labour in the study area. In real terms the wage rates have increased by more than 70% for male and doubled for female workers during three years of project period.
- However, there is no reduction in number of days migrated in Amblikoppa as compared to reduction of 8% and 40% in the number of days migrated among landless beneficiaries and beneficiaries with land in Devargudihal.
- Average cumulative savings per household as on date were the highest for beneficiary households with land in both the villages at Rs. 11365, followed by Rs. 4272 for non beneficiaries and Rs.3072 for landless beneficiaries.
- Beneficiary households appear to have higher credit absorbing capacity with an average of Rs. 3288 and Rs. 3679 as compared to Rs. 2438 and Rs. 1758 for non - beneficiary households in Amblikoppa and Devargudihal respectively.

- 15% of beneficiary households in Amblikoppa and 7% of the beneficiary households in Devargudihal have moved out of poverty line (considering Rs. 18,000 as cut off range on the basis of threshold limit considered by Govt. of Karnataka for identifying beneficiaries under government welfare programmes). The households below poverty line has increased among non beneficiary households both in Amblikoppa and Devargudihal by 7% and 23% respectively indicating non availability of income support activities in comparison to beneficiary households.
- From the review of available literature discussed in section 2.8 of chapter II it can be stated that although poverty reduction is usually an objective of watershed management programs, empirical evidence of poverty reduction impacts is found to be weak in many of the studies. There is limited reference to direct impact of watershed treatment on poverty alleviation, but studies do indicate rise in agricultural output, increase in soil moisture, availability of drinking water, fodder availability, employment opportunities and positive benefit cost ratio. Some of the studies reveal mixed outcomes of watershed projects. While there are reports of improvement in skills due to training, availability of loan, benefits could not be realized to full extent due to lack of sustained and large scale market linkages, lack of coordination and lack of follow-up. The evidences of positive impact of watershed interventions, which indirectly have an impact on reducing poverty are summarized in table 2.8 in chapter II.

Based on the above discussions we can conclude that indirectly SWP has positive impact on increasing the income of beneficiary households. Although the extent of positive variations is not very high, beneficiary households are in a better off situation with reference to the indicators discussed above as compared to non beneficiary households.

6.14 Community organization and participation

6.14. a. Self Help Groups

Self Help Groups (SHGs) are voluntary organizations formed by poor for promoting small savings and providing credit to members for self employment and for meeting their personal needs. SHGs are also involved in social activities to promote leadership and create awareness about the social and economic empowerment of poor individuals, particularly women. Sujala watershed project being a community based programme highlights the role of SHGs involving rural people in the project and in helping them to overcome their poverty through improving agriculture, horticulture and animal husbandry, etc. Hence the membership of SHG is an important step towards successful implementation of rural oriented development scheme like the Sujala Watershed Project. The study has revealed that the membership of SHGs by beneficiary respondents in Amblikoppa subsequent to SWP has gone up by 42% and the number of households participating in SHG has increased by 41%. However, the number of members of SHGs and the households covered by them relating to non-beneficiaries has declined by 29% and 20% respectively.

In Devaragudihal also the post SWP period has witnessed a rise in the number of SHG members and the number of households covered by the SHG by 13.6% and 16.4% respectively. Non beneficiary participation in SHG activities has declined by 4% in the post project period. The following table (6.31) provides the details.

Table-6.31

Membership of SHGs in Amblikoppa and Devaragudihal Before and After SWP

	Amblikoppa						Devaragudihal					
	Beneficiary		Non Beneficiary		Total		Beneficiary		Non Beneficiary		Total	
	No of Memb	No of HHs	No of Members	No of HHs	No of Members	No of HHs	No of Members	No of HHs	No of Members	No of HHs	No of Members	No of HHs
Before	33	32	17	15	50	47	59	55	24	22	83	77
After	47	45	12	12	59	57	67	64	23	21	90	85
% Change	42.4	40.6	-29.4	-20	18	21.3	13.6	16.4	-4.16	-4.5	8.4	10.4

Source: Primary Survey Data

6.14. b Households Receiving Loan from Self Help Group

The study has revealed that higher percentage of (46% in Amblikoppa and 55% in Devargudihal) beneficiary households have received loan from SHGs than non beneficiaries (31% in Amblikoppa and 50% in Devargudihal) as shown in table 6.32.

Table-6.32

Households Receiving Loan from Self Help Groups (%)

Amblikoppa		Devaragudihal	
Beneficiary	Non Beneficiary	Beneficiary	Non Beneficiary
46%	31%	55%	50%

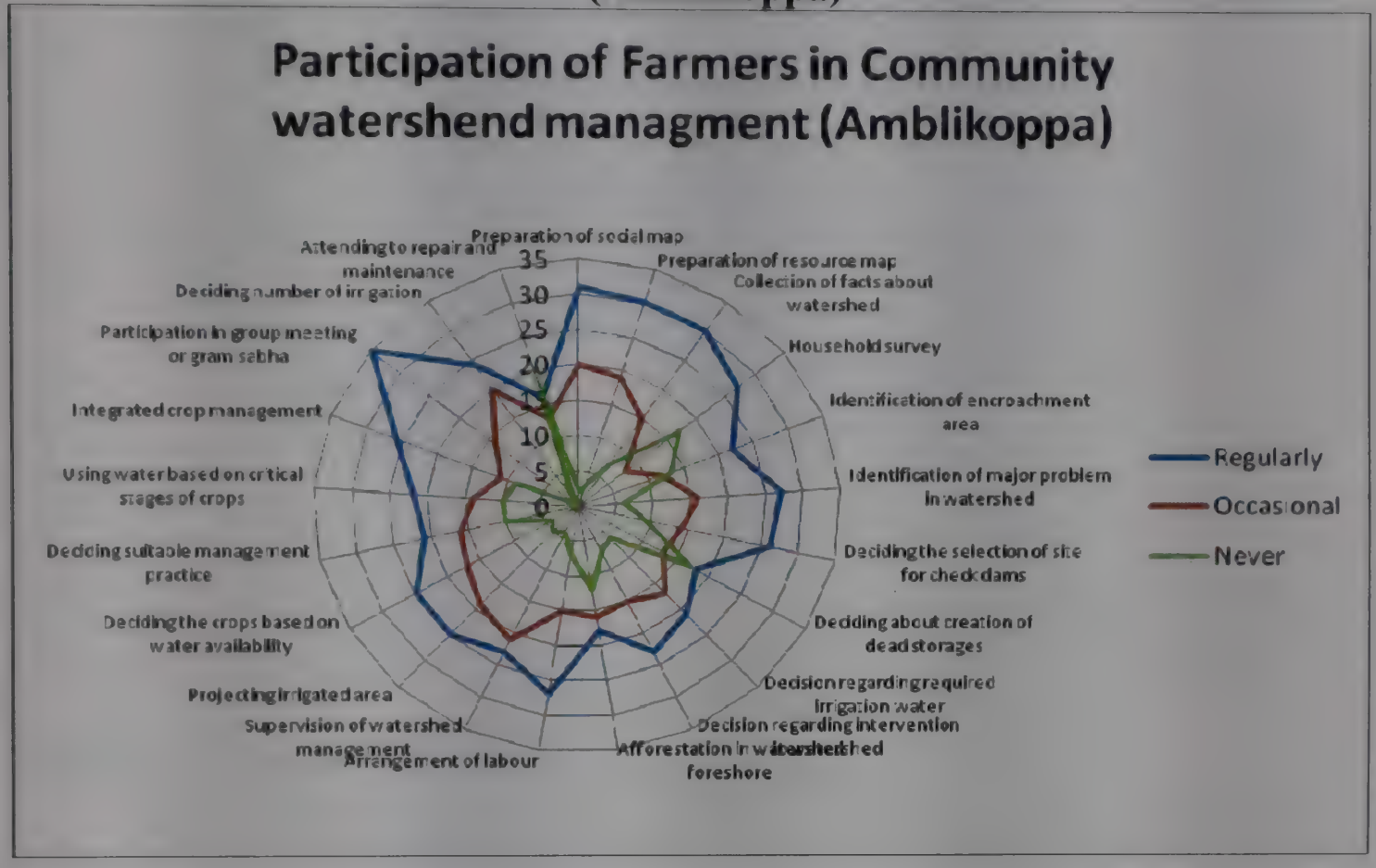
Source: Primary Survey Data

6.14.c. Extent of participation of farmers in community watershed management (Amblikoppa)

The field survey data presented in Fig-4 shows that 51% of the Amblikoppa farmers regularly participated in community watershed management activities and about 32% of the farmers participated occasionally and 16% of the farmer respondents did not participate in any of watershed management

activities. Participation in group meetings and gram sabha, preparation of social and resource map, arrangement of labour, identification of major problems in watershed, selection of site for check dams are some of the activities regularly participated by beneficiaries in Amblikoppa.

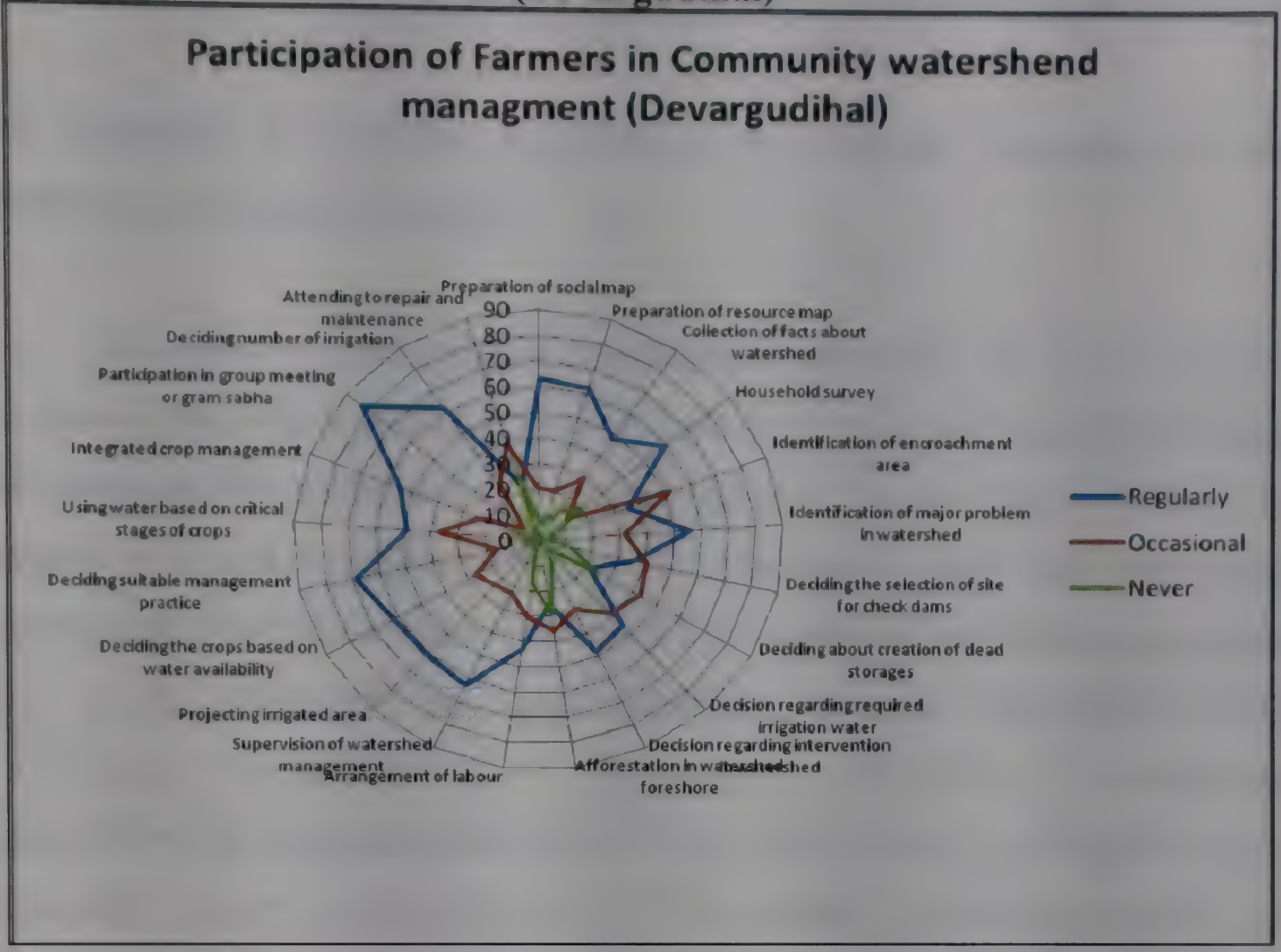
Fig-6.4 Participation of farmers in community watershed management (Amblikoppa)



In Devargudihal in addition to the activities discussed above beneficiaries involved themselves regularly in deciding management practices and supervision of watershed. As shown in Fig-5, 56% of the farmer respondents regularly participated in community watershed management activities and 32% of the farmer respondents participated occasionally and about 11% of the farmers did not participate in any of watershed management activities.

Deciding on creation of dead storage, household survey and afforestation programmes are some of the activities never attended to by beneficiary households in both the villages.

Fig-6.5 Participation of farmers in community watershed management (Devargudihal)



6.14. d Community Contribution Towards SWP

Contribution towards the successful implementation of SWP by the beneficiaries and non-beneficiaries is limited mainly to beneficiaries who affirmed positively (85.25%) in Amblikoppa. It was lower at 59.48 percent in Devaragudihal.

The implementation of Sujala Watershed Project is based mainly on community participation. The project aims at strengthening capacities of communities for participatory involvement in planning, implementation, social and environmental management and maintenance of assets emanating from local level development programme. Community Based Organizations (CBOs) include Sujala Watershed Sanghas, Area Groups, Self Help Groups. The Sujala Watershed Sanghas (SWS) consist of all the beneficiary households in the project area. The SWS Executive Committee (EC) is the functional organ. SWS and EC

consist of representatives from AGs (5-6 members) and SHGs (5 members). Gram Panchayats are represented by 1 or 2 members at the micro watersheds.

6.15 Ranking of Facilities required in the villages According to the Preferences of respondents (%)

The statistical tools mean and standard deviation (SD) are used to analyze the ranked data, which include questions with positively and negatively worded statements on five point scale viz. strongly agree – 5, agree – 4, undecided – 3, disagree – 2 and strongly disagree – 1. The results show that the village respondents of both the villages have wish list in order of their ranking presented here; i) for improved bus services(SD=20), ii)better education(SD=9.0), iii)drinking water(SD=9.9), iv)irrigation (SD=2.7), v)credit/loan facility(SD=3.9), vi)approach roads(SD=4.04), vii)veterinary services(SD=4.35), viii)health care facility(SD=4.39), ix)watershed development(SD=5.4), x)continuous provision of electricity(SD=3.3), xi)banks(SD=3.4), xii) individual toilets(SD=4.29) and xiii)community toilets(SD=6.3).

The percentage of households giving first rank was higher for bus services (32%), drinking water facility (22%) and education (17%) among all other services. None of the households gave last preference to drinking water supply. Watershed facility has been given first preference by 14 percent of respondents in both the villages (which could be due to awareness created by SWP), but ranks ninth in overall household preferences for services in both the villages. The households do not feel the impact of watershed development in short run as the gains are usually after a period of time. Moreover, households are not aware of the vast array of indirect benefits that accrue to the village from watershed development. Therefore watershed development is not on the priority list of farmers and households.

Lower preferences have been indicated by respondents for facilities like medical, individual toilets, community toilets, irrigation, credit/loan facility, health care, veterinary, etc.

6.16 Perceptions of Beneficiaries on Sujala Watershed Project

The perceptions of the respondent beneficiaries of Sujala Watershed Project obtained through personal interviews during field survey in the two study villages of Amblikoppa and Devaragudihal have revealed high favourable impact of the project on their socio-economic well being. Disagreements with majority perceptions are marginal and negligible and hence the Sujala project has generated highly favourable opinion among the beneficiaries. The benefits, which have been attributed to SWP by more than 70% of the beneficiaries include increased opportunities for undertaking income generation activities, improvement in soil moisture, increase in water table, increase in vegetation cover, increase in community participation in watershed development activities, reduction in migration of labour, impact on control of soil erosion and arrest of activities of SHGs in the village, increase in employment opportunities and improvement in ground water recharge in the village.

In addition, the benefits of SWP are also recognized in terms of increase in fodder, increase in disease and pest control, easy availability of credit and fertilizers, pollination, wild life habitat, reduction in drought conditions, etc, as envisaged by more than 50% of the beneficiary responses.

Overall SWP is considered as a boon to village economy by 89 percent and 100 percent of respondents in Amblikoppa and Devaragudihal respectively.

However, SWP also suffers from loopholes as around 60-70% of responses indicate negative perceptions about some of the interventions. The beneficiaries feel that training provided by SWP is monotonous and impractical,

it lacks accountability and transparency in conducting the watershed activities, supports favouritism in work allotment and credit and benefits only big farmers.

The above responses indicate the perceptions of the respondent beneficiaries of SWP in the two study villages. There is an overwhelming appreciation about the immense benefits of the Sujala Watershed Project among the beneficiaries within the project villages. However the few negative perceptions need to be looked into and necessary action should be taken for streamlining the implementation of the Sujala Watershed Project for better results. Table 6.33 provides complete detail of beneficiary perceptions on SWP.

Table-6.33
Perceptions of Beneficiaries on Sujala Watershed Project (%)

Positive Statements	Amblikoppa				Devaragudihal			
	Agree	Undecided/ Don't know	Dis agree	Total	Agree	Undecided/ Don't know	Dis agree	Total
SWP has helped landless farmers in undertaking income generating activities	84.8	2.2	13.0	100.0	98.0	1.0	1.0	100.0
SWP has increased the use of fertilizers and pesticides	56.0	34.0	10.0	100.0	48.0	32.7	19.4	100.0
SWP has improved soil-moisture in the fields	91.7	6.3	2.1	100.0	71.1	25.8	3.1	100.0
There is increase in vegetation cover in the village after SWP	91.8	6.1	2.0	100.0	80.2	10.4	9.4	100.0
Water table has gone up due to SWP	72.9	8.3	18.8	100.0	57.1	18.7	24.2	100.0
SWP has encouraged and increased community participation in watershed development activities	76.1	8.7	15.2	100.0	62.2	29.6	8.2	100.0
SWP has reduced migration of labourers in village	87.2	6.4	6.4	100.0	77.6	16.3	6.1	100.0
SWP has positive impact on control of soil erosion and arrest of run-off water	75.6	20.0	4.4	100.0	68.4	23.5	8.2	100.0
Increase in availability of fodder to animals	63.8	17.0	19.1	100.0	56.1	7.1	36.7	100.0
Due to SWP farmers have shifted from food grains to commercial crops	87.2	8.5	4.3	100.0	83.2	11.6	5.3	100.0
SWP has increased the activities of SHGs/No of SHGs in the village	91.7	0.0	8.3	100.0	99.0	0.0	1.0	100.0
SWP has resulted in increase in employment opportunities to poor/ landless	84.4	8.9	6.7	100.0	98.9	0.0	1.1	100.0

Positive Statements	Amblikoppa				Devaragudihal			
	Agree	Undecided/ Don't know	Dis agree	Total	Agree	Undecided/ Don't know	Dis agree	Total
There is improvement of village common grazing land	80.0	0.0	20.0	100.0	59.4	12.5	28.1	100.0
SWP has resulted in easy availability of seeds and fertilizers	67.4	16.3	16.3	100.0	41.1	23.2	35.8	100.0
Ground water recharge	90.2	2.4	7.3	100.0	53.2	34.0	12.8	100.0
Pest and disease control	60.0	17.8	22.2	100.0	35.5	18.3	46.2	100.0
Facilitate pollination	43.9	43.9	12.2	100.0	43.5	48.9	7.6	100.0
Improved wild life habitat	41.9	32.6	25.6	100.0	48.4	42.1	9.5	100.0
Reducing risks of drought	76.2	7.1	16.7	100.0	60.2	6.5	33.3	100.0
Improvement in veterinary services	69.6	8.7	21.7	100.0	59.6	3.2	37.2	100.0
Overall SWP is a boon to village economy	89.1	6.5	4.3	100.0	100.0	0.0	0.0	100.0
Any other	100.0	0.0	0.0	100.0	100.0	0.0	0.0	100.0

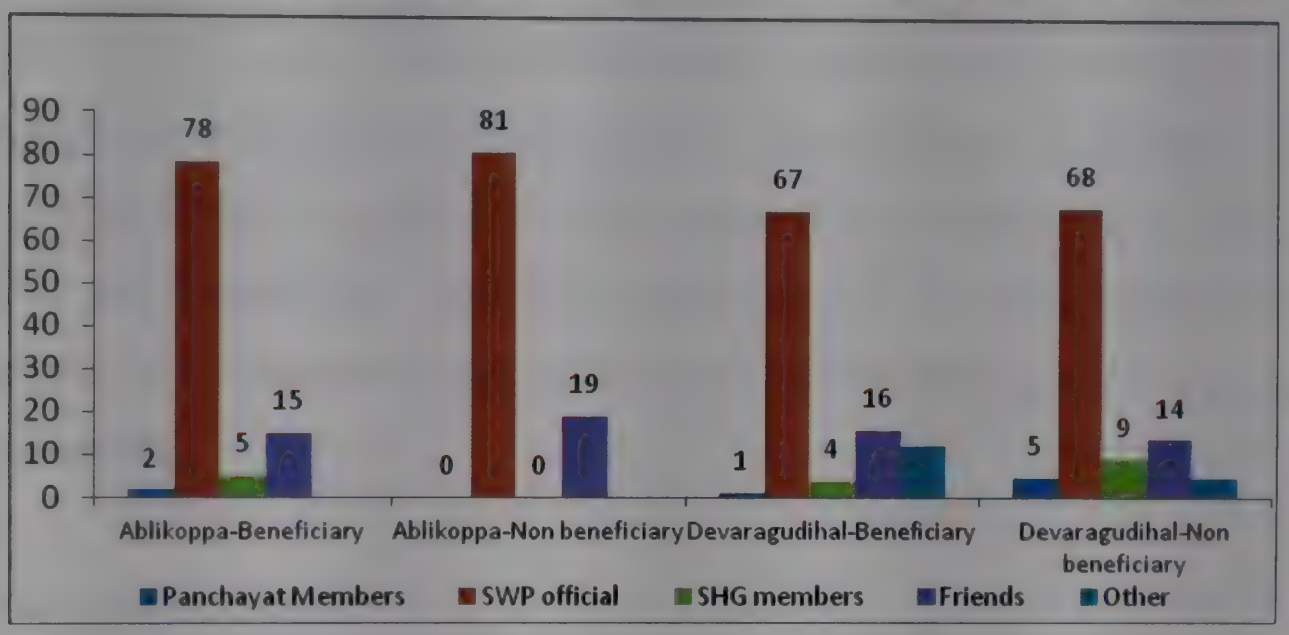
Negative Statements	Amblikoppa				Devaragudihal			
	Agree	Undecided/ Don't know	Disagree	Total	Agree	Undecided/ Don't know	Disagree	Total
Training provided by SWP are monotonous and not practical	29.8	14.9	55.3	100.0	36.7	30.6	32.7	100.0
SWP has benefited only the big farmers	27.7	2.1	70.2	100.0	69.4	3.1	27.6	100.0
There is no accountability and transparency in conducting the watershed activities	66.0	23.4	10.6	100.0	46.9	39.8	13.3	100.0
There is favoritism in work allotment under SWP	79.5	4.5	15.9	100.0	68.1	20.2	11.7	100.0
There is favoritism in providing credit under SWP	77.8	4.4	17.8	100.0	69.1	12.8	18.1	100.0

Source: Primary Survey Data

6.17 Awareness of Sujala Watershed Program Among Beneficiary and Non-beneficiary Groups

A high level of awareness about the Sujala Watershed Program among the beneficiary and non-beneficiary respondents is ascertained through field survey. In Amblikoppa 96.72 percent of beneficiary respondents were aware of SWP as against 65.52 percent of non-beneficiary respondents. In Devaragudihal awareness of the program (SWP) was among 92.24 percent of beneficiaries and 42.45 percent of non-beneficiaries. The average awareness among beneficiaries and non-beneficiaries in Amblikoppa and in Devaragudihal was 86.47 percent and 79.38 percent respectively.

Fig-6.6 Awareness of SWP according to source



The major source of awareness of SWP was the officials of the SWP in the area. They accounted for 78.33 percent and 80.95 percent respectively among beneficiary and non-beneficiary respondents in Amblikoppa with an average of 79.01 percent. In Devaragudihal the officials of SWP accounted for 67.29 percent and 68.18 percent respectively among beneficiary and non-beneficiary respondents with an overall average of 67.44 percent. The other sources of awareness which were of little magnitude were friends, SHG members and panchayat members.

6.18 Role of Non-Government Organizations in the Implementation of Sujala Watershed Project

The Sujala Watershed Project uses a complex institutional structure to develop critical partnerships between government technical specialists, non governmental organizations (NGOs) communities, local authorities and research organizations. The project aims at involving NGOs at sub-watershed levels to facilitate awareness building, capacity building, participative project planning implementation and monitoring. The local people need services of the NGOs continuously since the participation of the villagers has to be real and effective in all the processes of the project implementation such as planning, budgeting, execution and monitoring.

The NGOs seem to have met the above requirements according villagers by playing their designated role effectively in selected micro watershed villages. They have functioned as motivators and organizers of community groups, mass education and trainers for capacity building among the beneficiaries and as coordinators of government field functionaries and the local groups in executing the programmes.

NGOs in Devaragudihal

In Devaragudihal the Sujala Watershed Program has been implemented in association with Bijapur Integrated Rural Development Society, Hungund (BIRDS) a non-government organization for achieving the above objectives and development of the area.

NGOs in Amblikoppa

The Belgaum Diocese (BDSSS) Social Service Society, Sevalaya Dharwad participated in coordinating the rural development activities in Amblikoppa micro watershed village under the Sujala Watershed Project.

The involvement of NGOs has been witnessed in following activities as reported by beneficiary households in project villages;

Table 6.34
NGO involvement in SWP activities

Sl. No.	Activity	Beneficiary Responses (%)	
		Amblikoppa	Devargudihal
i)	Involvement of Gram Panchayats in management, monitoring and implementation of watersheds	48.0	37.0
ii)	Community management of watersheds after completion of the project	36.0	29.0
iii)	Change in cropping pattern	49.0	51.0
iv)	Employment generation	63.0	59.0
v)	Migration	55.0	66.0
vi)	Promotion of Self Help Groups	75.0	79.0
vii)	Developing income generating activities	72.0	76.0
viii)	Promoting social forestry for vegetation cover	58.0	62.0
ix)	Promoting availability of fodder for livestock	59.0	62.0
x)	Positive impact of MNREGA	65.0	67.0
xi)	Making facilities for drinking water	72.0	70.0
xii)	Follow up of the project implementation	54.0	52.0

Source : Primary Survey Data

As shown in table 6.34, NGO participation is perceived to be higher in promotion of self help groups, developing income generating activities, arrangement of drinking water, routing MNREGA activities, etc. Beneficiaries are not happy with NGO's involvement in management of watersheds after completion of the project, their role in involving gram panchayats in watershed management and in diversification of cropping pattern.

6.19 Revelations from Focused Group Discussions (FGDs)

The researcher tried to capture the perceptions of the community as a whole on implementation of SWP in their village irrespective of individual benefits that accrued to beneficiaries alone. Two FGDs one each in selected micro watershed villages were organized involving members of gram panchayat, village elders, farmers, landless beneficiaries and non beneficiaries, SHG members and youth society members.

- Villagers felt that SWP had received wider publicity even before its implementation and continued to get mileage during project period also. The ground work done by NGO helped retain curiosity and enthusiasm and created a feeling of "village" project among all the households including non beneficiaries.
- Participation of Gram Panchayat in management, monitoring and implementation of the project, particularly in community projects was recognized in FGD.
- The group felt that whatever little success SWP has gained is due to involvement of NGO at local level both before and during project implementation.
- The group felt positive changes in crop yield over the years in SWPvillages as compared to neighbouring villages.
- The increase in employment opportunities available to youth and unemployed agricultural labourers who were not beneficiaries of SWP was highlighted in FGD.
- Due to employment opportunities generated on account of project work members of FGD in Devargudihal reported reduction in migration of labourers to other places in search of job opportunities.
- Women's empowerment through formation new and revival of weak SHGs was one of the major benefits reported by FGD. SHGs are reported to have generated varied activities and facilitated loan to poor women through revolving fund.
- The group was happy with the improvement in the agriculture and allied activities that have led to individual dairies, poultry and other village based occupations in the two study villages after Sujala.
- There has been improvement in the supply of potable (drinking) water in the villages covered by the Sujala Watershed. Water for other uses has also been made available due to the project activities. Villagers perceive increase in water table and soil moisture due to Sujala, which has been proved technically also.

- Other benefits of SWP listed by FGD include social forestry, development or revival of horticulture, which had lost its importance due to dry land agriculture, increased vegetation cover in two micro watershed villages and improvement in the supply of fodder for the livestock in the villages.
- The village community in the FGD also noticed lack of sustained management and repair of community water harvesting structures created under the project, while individual structures were well maintained by beneficiaries. The main reasons for lack of maintenance was the withdrawal of NGOs from project site and weak organization of water management committees on peripheral basis.
- Although SWP brought in positive changes in employment, yield and income level of beneficiary households, the overall opinion of the FGD was that benefits did not reach all the participants uniformally due to lack of clarity on the long term benefits of SWP, participation of hoseholds due to pressure from NGOs, lack of resources and lack of knowledge about dry land farming.

6.20 Conclusion

With the launch of Sujala watershed project in Amblikoppa and Devaragudihal agricultural and allied activities like livestock rearing, dairy farming, horticulture, forestry and fisheries have undergone noticeable changes in terms of higher productivity and higher income in favour of beneficiary farmers. The non-beneficiary landless and marginal farmers have also benefited in terms of employment opportunities and higher agricultural wages in the Sujala watershed areas as revealed by household survey.

Increase in savings of both beneficiary and non-beneficiary households has led to their economic empowerment. Better living standards of the households are indicated through increase in household and agricultural assets.

On the social front community participation and cost sharing in the Sujala watershed project have been significant achievements, therefore there is feeling of "our" or "village" project. Involvement of NGOs, Self-Help groups and Panchayat institutions in planning and implementation in the project indicates greater social awareness for the socio-economic welfare of the people in the study areas. Both quantitative and qualitative indicators and information collected from secondary sources, household survey and FGDs justify overwhelming response given to SWP in project villages.

CHAPTER-VII

SUMMARY OF FINDINGS, CONCLUSIONS AND SUGGESTIONS

In this chapter the researcher provides a gist of the study in the background of research context, research questions and findings of the study followed by suggestions to fortify the programme for the benefit of village community in the future.

7.1 Introduction

Watershed management is a tool to improve agricultural productivity and to upgrade and enhance livelihood options in the rainfed and drought prone regions. The strategy aims at promoting diversity of crops, horticulture, livestock and wage employment through creation of assets and water harvesting structures ultimately reducing poverty in the region. The management of watershed programme includes desilting of community tanks for enhancing storage, construction of check dams for infiltration of surface water, farm ponds for storing rain water and increasing soil moisture, creating bunds and terraces for soil and water conservation, afforestation and social forestry for increasing vegetation cover, supply of fertilizers, seeds, seedlings, etc.

The success and sustainability of watershed development depends on factors such as creation of awareness in the community about the project, their involvement in planning and implementation, building of local institutions for project management, management and maintenance of created structures.

Many centrally sponsored watershed programmes viz., Drought Prone Area Development Programme (DPAP), Integrated Wastelands Development Project (IWDP), National Watershed Development Project for Rainfed Areas

(NWDPRA), Indo-German Watershed Development Project (IGWDP), Desert Development Programme (DDP), Employment Assurance Scheme (EAS), etc. were introduced during 1960s under Five year plans in addition to state specific watershed development programmes. The National Rainfed Area Authority (NRAA) was established by Central Government in 2006 to focus on improving the development of rainfed areas of the country.

Karnataka state has rich experience of managing watershed development programmes viz., Karnataka Watershed Development Programme (KAWAD), Western Ghat Development Programme (WGDP), River Valley Project (RVP), NABARD Assisted Watershed Development Project (NAWDP) and Sujala Watershed Development Project (SWDP) in addition to implementation of centrally sponsored programmes.

The impact of watershed development projects have been reviewed by various researchers and agencies. Jodha (2001) has opined that in fragile areas sustainability in agriculture is not possible through traditional measures. He has stressed the need for application of modern science and technology with the rationale of indigenous technology. Palanisami et al. (2009) have observed that benefits from watershed development activities are not limited only to users / beneficiaries but also extend to the non-participating farmers. Other studies have revealed that benefit cost ratios are favourable to watershed treated areas than non-treated areas. Chandrudu (2010), Gowda and Satish (2011), Jelly et al. (1995), Ram Mohan Rao et al. (1995), Reddy (2000), Sharma (1995), Singh et al. (1995) and Swarnalatha et al. (1994), Turton (2000) have emphasized sustainable livelihood approach to assess the impact of watershed projects in India. According to them important issues in watershed treatment should be improving the access of the poor to common property as a result of watershed development and the support of watershed project to livelihood of the poor. The World Bank Study (Salah et al., 2008) has observed that although profitability is a key for engaging stakeholders in conservation of watershed management, interventions

may not in themselves be profitable for stakeholders. Establishing accurate estimates of costs and benefits, both at the farm level and beyond has proved difficult. The ICAR study in Arunachal Pradesh has revealed that watershed project interventions have increased cropped area by 14 percent and cropping intensity by 22 percent. However, the said project failed to generate local participation, women's involvement, coordination between line departments and NGO participation. Empirical evidence of poverty reduction due to watershed projects is found to be weak in many of the studies.

Sujala Watershed Development Project –phase III is a World Bank sponsored project implemented in 6 districts of Karnataka state viz., Dharwad, Haveri, Chitradurga, Chikballapur, Kolar and Tumkur covering about 4.27 lakh hectares of land in 38 taluks. The project is in operation since 2006.

The total proposed investment in Sujala project was Rs. 676.96 crores. The World Bank Loan through Government of India was Rs. 523.43 crores (77.3%). The contribution of Government of Karnataka was Rs. 84.27 crores (12.5%) and the stakeholder's contribution was Rs. 69.26 crores (10.2%).

The broad objective of Sujala project is to increase the production potential of the watershed by involving communities in the process through building people's institutions and training them to plan, implement and manage their own resources. The project aims at reducing soil erosion, increasing soil fertility, increase land cover, increasing cropping intensity, applying space technology in planning and monitoring of the project and participatory implementation by the community for which NGOs and the department are the facilitators. Executive Committee of SWS plays important role in planning, organization, keeping of accounts, mobilization of contributions, providing leadership to SHGs and AGs, etc.

Community cost sharing is another salient feature of Sujala Watershed Project. Communities contribute amount varying with activities by cash, kind or labour.

7.2 Main findings of the study

Age-wise distribution of beneficiaries of Sujala Watershed Project indicates that majority (63%) of respondent beneficiaries of Sujala Watershed Project in the two study villages of Amblikoppa and Devaragudihal to be in the economically active age group of 15-49 years.

Educational status of the heads of the households indicates that majority of them were illiterates both in Amblikoppa and Devaragudihal. Majority of respondent beneficiaries were involved in own farm agriculture in the two study villages followed by hired agricultural labour. The two study villages of Amblikoppa and Devaragudihal in Dharwad and Hubli taluk respectively have largely dry land farming (>70%) depending upon rains.

Wage rates in the two villages covered by the Sujala Watershed Projects have gone up after SWP. Wage rates have increased by 73% in the case of male labourers and by 107% in the case of female labourers. The average asset holding has gone up slightly after Sujala by 188% in Amblikoppa and by 171% in Devargudihal. In the case of non beneficiaries assets have increased by 98% in Amblikoppa and by 86% in Devargudihal. Livestock rearing is a sub occupation as 44% of the sample households in two selected villages rear livestock.

Majority of the beneficiaries of the Sujala Watershed Project in Amblikoppa and Devaragudihal have indicated high preference for facilities like improved bus services (32%), drinking water (22%), roads and educational facilities (17%). Lower preference has been indicated by respondent beneficiaries for facilities like individual toilets, community toilets, irrigation, credit, health care, veterinary service, etc. First preference for watershed is exhibited by a good

number (14%) of beneficiaries, but watershed ranks ninth in respondents' overall preferences for facilities. Sujala Watershed Project in the study villages has provided for training in tailoring, dairy and other self employment and support activities. Credit absorbing capacity of beneficiary households appears to be higher as compared to non beneficiaries as indicated by average credit availed by respondents. Respondent beneficiary households in Amblikoppa have obtained more credit (57%) for house construction. Among the non-beneficiaries higher credit was obtained for domestic purpose. In Devaragudihal beneficiary respondents borrowed higher amount of loan for purchase of vehicles (74%). Among the non-beneficiaries higher amount of loan was borrowed for agriculture. It appears that sujala beneficiaries are capable of maintain agricultural expenditure on their own. Direct benefits of the Sujala Watershed Project in the two study villages include technological improvement in farm management, improved production practices, horticultural management and forestry. Indirect benefits include higher income, wage increase, credit facilities, etc.

The study has revealed that among the beneficiaries with land there has been a decrease in family male and female labour and increase in hired labour for agricultural activities after Sujala Watershed Project (SWP) in both the study villages of Amblikoppa and Devaragudihal. The annual man days of work in agriculture per household among beneficiaries with land has increased by 1.3 % in Amblikoppa to 20% in Devargudihal. However the annual man days of work per household among the non-beneficiaries has decreased by 24% in Amblikoppa and by 29% in Devargudihal after the implementation of SWP in the two villages.

The study has revealed contrasting trends regarding the number of days migrated in search of employment after the start of Sujala project in the two study villages. Migrated days have increased in Amblikoppa and decreased in Devaragudihal.

Self employment training has been a component of the Sujala project. The responses indicate that training is useful particularly for small and marginal farmers and for landless rural workers both in the case of beneficiary and non-beneficiary respondents in the two study villages.

SWP has helped landless farmers in undertaking income generating activities according to 84.8 percent of respondents in Amblikoppa and 98 percent of respondents in Devaragudihal. SWP has been helpful in many other ways like increase in the use of fertilizers, improved soil moisture, increase in vegetation, increased community participation, reduction of migration, increase in employment opportunities to poor/landless, improvement in groundwater level, etc.

The Sujala Watershed Project has yielded better results in all occupations related to agriculture and livestock. The households involved in dairy farming have revealed that there has been an increase in milk production from their milch animals. Further the returns from milk production have gone up in both the study areas for both beneficiary and non-beneficiary respondents of SWP.

The beneficiary and non-beneficiary respondents in both the study villages have resorted to planting of seedlings under horticulture and forestry activities. The seedlings included teak, mango, sapota, coconut, neem, jasmine, etc. There has been a good increase in these plantations initiated during the SWP.

The Sujala Watershed Project has led to the generation of additional employment in agriculture as well as non-agricultural sectors. This has been revealed through field survey in the two study villages. There was increase in number of days of gainful employment by 5%in Amblikoppa and by 12% in Devargudihal. Additional employment generated has been higher in case of beneficiaries of SWP (39 mandays) compared to non-beneficiaries (33 mandays). Further additional employment generated in agriculture is higher than in non-agricultural occupations.

There has been an increase in annual income of households benefited by the Sujala Watershed Project. The increase in annual income has been indicated in agriculture and allied activities and business. The positive impact of increase in annual income is substantial in case of beneficiaries of SWP (103% in Amblikoppa and 38% in Devargudihal) compared to non-beneficiaries (17% in Amblikoppa and 4% in Devargudihal). But, annual income of both beneficiaries and non beneficiaries has declined in real terms (constant prices) indicating that the rise in income is not in phase with inflation.

The study has revealed that the cropping intensity has not shown significant change relating to cultivation by beneficiaries with land and without land and non-beneficiary respondents.

The role of Self Help Groups has much relevance in the implementation of Sujala Watershed Project. The study has revealed that the membership of SHGs by beneficiary respondents and the number of households involved in SHGs in the study villages has gone up. SHGs in study villages were found to be active in disbursement of loans to needy women for self employment.

The households in the study villages covered by the Sujala Watershed Project have developed savings habits and have invested the same in different avenues. Savings capacity of SWP beneficiaries with land is found to be high compared to other SWP beneficiaries and non-beneficiaries. Training for self employment is necessary as managing enterprises need the knowledge of market, production techniques and financial and accounting management. Training for self employment was availed by 28 percent of respondent beneficiaries of SWP in the two study villages.

The number of households with higher annual income has gone up after SWP among beneficiary and non-beneficiary respondents. 15% of beneficiary households in Amblikoppa and 7% of the beneficiary households in

Devargudihal have moved out of poverty line (Rs. 18,000 threshold limit) Introduction of new crops in the Sujala Watershed Project areas of the two study villages has been taken up by a handful of households among the beneficiary respondents. The crops introduced include traditional food crops, oil seeds, mango, flower, coconut and teak.

The study has revealed a high level of awareness about the Sujala Watershed Program among the beneficiary and non-beneficiary respondents in the two study villages. The overall average awareness among the beneficiary and non-beneficiary respondents of SWP in Amblikoppa and Devaragudihal was 86.47 percent and 79.38 percent respectively. The major source of awareness was the officials of the SWP in the area accounting for 67.44 percent.

Community contribution is a must for initiation of SWP. 85.25 percent of the beneficiaries in Amblikoppa have reported contribution in terms of cash and kind, while 59.48 percent in Devaragudihal reported contribution towards the project.

The yield of agriculture of the beneficiary respondents of Amblikoppa has increased substantially after SWP. This trend is observed with regard to food and commercial crops during all the seasons. In Devaragudihal the yield has increased during rabi season, but there is a decline in kharif and summer seasons. The value of agricultural crops of beneficiary respondents of SWP has gone up after the start of the project compared to the previous period. However the value of agricultural crops of non-beneficiaries has indicated a decline for commercial crops and food crops. Yield per acre in irrigated areas in the two study villages has increased marginally after the introduction of Sujala Watershed Project in the study villages.

The annual average produce from livestock rearing indicates an increase in milk produce for both beneficiary and non beneficiary respondents. Although

the increase in milk production during pre and post project period is significant in the case of non beneficiaries than beneficiaries, in absolute terms the average milk production per household is higher for beneficiary households in both the villages. There has been a substantial increase in the annual earnings from sale of livestock produce after the implementation of Sujala Watershed Project by 120% in Amblikoppa and by 33% in Devarguidhal.

Non Government Organizations as perceived by beneficiaries and members of FGD have played active role in coordinating the activities of the SWP in Amblikoppa and Devaragudihal. In Amblikoppa the NGO-BDSS (Belgaum Diocese – A Social Service Society Sevalaya, Dharwad) participated in coordinating the activities under the Sujala Watershed Project. In Devaragudihal BIRDS (Bijapur Integrated Rural Development Society, Hungund) assisted the Sujala Watershed Project for achieving the objectives of the project.

As per project reports beneficiary household under the Sujala Watershed Project have been contributing towards total project expenditure. The households in the two study villages have contributed 22 percent of the total expenditure of project cost while the official contribution was 78 percent. The average contribution of farmers belonging to marginal, small and large groups in Amblikoppa was higher (24.26%) compared to those in Devaragudihal (19.36%).

The total number of beneficiaries involved in Sujala Watershed Project in the two study villages was 473 with land area of 957.37 hectares. Of these 14% were marginal farmers, 42% small farmers and 44% large farmers.

The overall impact of Sujala Watershed Project in the two study villages was also assessed through discussions with the stakeholders viz. gram panchayat members, village elders, beneficiaries, SHG members, youth and Community Based Organizations (CBOs), SWS and EC, etc. The discussions have revealed positive impact of the SWP on the socio-economic life of the rural community in

the study villages. There has been active participation of the stakeholders in planning, implementation and monitoring of the Sujala Watershed Project. There has been positive change in cultivation viz. multi-cropping, horticulture, plantation of teak and increase in employment of youth and increase in wage rates.

However some negative perceptions have been expressed by some respondents about the impact of SWP. They relate to monotonous and non-practical aspects of training provided under the SWP. The respondents have mentioned that the SWP has benefited mainly big farmers and there is lack of transparency and accountability. Favouritism in allotting work under SWP is mentioned by some respondents. Concern was expressed in FGD over lack of follow up, neglect of water harvesting structures in common land.

Despite these negative perceptions the study has revealed that there is overwhelming appreciation about the benefits of Sujala Watershed Projects by the respondents in the two study villages.

7.3 Limitations and suggestions for Policy Implications

FGD with stakeholders in both the villages pinpoints the fading effect of SWP in the villages. The influence of MNREGA on increase in work opportunities and reduction in migration cannot be ruled out. The study could not isolate the benefits of SWP from MNREGA. The withdrawal of NGOs from the project area has made community groups almost defunct in villages. Since most of the benefits are created on private land the need for management groups is almost nix.

Over and above the praise for SWP the FGD conducted in the two project villages revealed that the village representatives were skeptical about the trickling down effect of SWP in the coming days. While individual water harvesting structures would be maintained by beneficiary farmers, structures created in community land were likely to be left unattended due to absence of

effective area groups or watershed committees that seem to have disappeared after the withdrawal of NGOs. Therefore NGOs should continue to be associated with the village even after completion of the project period. Villagers fear the intervention of three years is too short and may not suffice the requirements of rainfed and poorly resourced region with majority of marginal and small farmers. Therefore, the activities need to be continued and linked to on- going government programmes to sustain the benefits in the long run and for the overall development of the community. Secondly, as expressed in FGD watershed development programmes should be spread over a period of minimum of five years from the initiation date so that villagers realize the benefits in real and monetary terms. Use of community water harvesting structures created or revived under the project should be priced and charged. The returns could be diverted to maintenance of such structures by panchayats for sustainability of the project on same wave lines in the selected villages.

In this background it is suggested that watershed project should encompass entire village whether it totally falls within watershed or not. Inclusion of only a part of agricultural land and part of the population group in a village divides the village as well the minds and creates groupies. Therefore watershed projects should encompass all the sections of population in order to get the benefit of spillover effects of watershed treatment to entire community and to attract the participation of all the members in developing community water harvesting structures and create a feeling of participation, ownership and responsibility of watershed project among villagers.

Measurement of current bio physical indicators like ground water table, soil moisture, surface water availability, etc., with appropriate technologies and comparing them with pre project scenario can be considered for future research for increasing the scientific validity of the study. Secondly, the present study considered beneficiaries and non beneficiaries within the village, wherein it is likely that the benefits of SWP may trickle down to non beneficiaries indirectly

on account of positive externalities associated with the project in terms of increase in wage employment due to watershed development activities. Future research can include non beneficiaries from another village with similar characteristics for a comparative analysis. It would also be worthwhile to carry out a research on the impact of watershed development after a gap of 5 years as such research would throw light on the sustainability of the project and returns on the investment.

Since the study was carried out immediately after the completion of the project it is likely that benefits of the investment made on watershed are still visible due to sustained efforts by the department and NGOs during the project period. Therefore, an investigation made after a gap of 5 years or more may rightly speak of the strength and impact of the project on which one can say whether the interventions made for developing watersheds yield short term results or benefit the community by overall development of the region in the long run.

REFERENCES

Agricultural Finance Corporation Limited (2011) Post Project Impact Assessment: Sujala I Phase -III Watershed Project. Final report submitted to Government of Karnataka. Agricultural Finance Corporation Limited, Bangalore.

Agricultural Finance Corporation Limited (AFCL) (2000) Quick Evaluation Study of Watershed Projects. AFCL, New Delhi.

Ballabh, V. and P. Thomas (2002) "Integrated Management of water and land for Sustainable Development in Semi-Arid Areas" in Dinesh K. Marothia (ed.) *"Institutionalizing Common Pool Resources"*, Concept Publishing Company: New Delhi: pp.152-169.

Bassi, N., and D. M. Kumar (2010), NREGA and Rural Water Management in India: Improving Welfare Effects, Institute for Resource Analysis and Policy, Hyderabad.

Batchelor, C.H., Rama Mohan Rao, M.S. and James, A. (2000). Karnataka Watershed Development Project: Water Resources Audit: KAWAD report 17. Karnataka Watershed Development Society, Bangalore, India

BDSSS (2009) Final report submitted to Karnataka Watershed Department, Dharwad.

BIRDS (2009) Final report submitted to Karnataka Watershed Department, Dharwad.

Bhatia A.K. "Environmental Issues in Water Resources Development" (1997) in Parikh J.K. and Sharma V.K. (eds.) *Environmental Database of Indian Economy*. Indira Gandhi Institute of Development Research, Mumbai:pp.1-21.

Centre for Science and Environment (1996) *The First Citizens Report 1982.* CSE. New Delhi.

Chopra K., Kadekodi G.K. and Murthy M.N. (1990) Participatory Development: People and Common Property Resources, Studies in Economic

Development and Planning, No.52, Institute of Economic Growth, Sage Publications, New Delhi.

Centre for Monitoring Indian Economy (CMIE) (2004) "*Agriculture*" CMIE. Mumbai.

Darghouth Salah, Christopher Ward, Gretel Gambarelli, Erika Styger, and Julienne Roux (2008) Watershed Management Approaches, Policies, and Operations: Lessons for Scaling Up. Water Sector Board Discussion Paper Series No.11, World Bank, Washington DC.

Dasupta Partha (1996) "Poverty and the Environmental Resource Base" in U. Shankar (ed.) *Environmental Economics,* Oxford University Press, New Delhi: pp.333-72.

Datar Chhaya (2007) "Failure of National Rural Guarantee Scheme in Maharashtra" *Economic and Political W*eekly, Vol. 52, No.34: pp.3454-57.

Deshpande, R. S. and G. Thimmaiah (1999) "Watershed development approach and experience of National Watershed Development Programme in the country," *Journal of Rural Development*, 18(3): pp. 453-469.

Deshpande, R. S., M. J. Bhende and S. Erappa (2003) "Output and Impact Monitoring Study of KAWAD Project," Project Report, Institute for Social and Economic Change, Bangalore.

Deshpande, R.S and V.R Reddy (1994) 'Watershed Development Approach in fragile resource region; Analytical study of Maharashtra', *Artha Vijnana* 36 (3):p.296

Devendrappa S. and Syed Sadaqath (2011) "Impact of Sujala watershed project on income generating activities of self help groups" *International Journal of Farm Sciences* 1(2) : pp.118-122.

Doherty Victor, Mirinda M.S. and Kampen Jacob. 'Social Organisation and Small Watershed Development' in Gurjar R.K. (ed.) *Socio-Economic Dimension of Irrigation*, Jaipur, Printwell. 1994.pp. 126-50.

Gadgil Madhav and Guha Ramachandra(2000) *The Use and Abuse of Nature*[incorporating two books 'This Fissured Land: An Ecological History of India:1992' and 'Ecology and Equity:1995, Oxford University Press, New Delhi.

Gawande S P. (2001) Community Participation in Integrated Watershed Management for Sustainable Productivity. In: G P Mishra and B K Bajaj (ed). *Community Participation in Natural Resource Management*. Rawat Publications, New Delhi: pp.109-118.

Government of India, (1989) *Statistics of Minor Irrigation Development.* Central Board of Irrigation and Power, Government Press, New Delhi.

Government of India, (1992) *Report of the committee on pricing of irrigation water*. Planning Commission, New Delhi.

Government of India, (2007) *Ground water management and ownership – Report of the expert committee.* Planning Commission, New Delhi.

Govindaiah, T., (1994) *Tank rehabilitation and integrated rural development.* Institute for Research in Social Sciences, Bangalore.

Gowda Govinda V. and Sathish A. (2011) "Socio-economic and natural resources impact of Sujala Watershed Project in Karnataka" *International Journal of Science and Nature*, Vol. 2(1): pp. 31-37.

Hope, R.A. (2007) "Evaluating Social Impacts of Watershed Development in India" *World Development*, 35(8): pp.1436-1449.

IIPS (2000)National Family Health Survey –NFHS-2 India (1998-99), IIPS, Mumbai.

ISEC, (2001): Social and Environmental Assessment of Community-Based Tank Improvement Project (Draft Report), Institute for Social and Economic Change, Bangalore.

Iyengar, V. (2007). Tanks of Karnataka: A historical perspective. In: Sandhya, I. (Ed.), *Waternama – A collection of traditional practices for water conservation and management in Karnataka.* Center for Development Learning, Bangalore.

Iyer K Gopal and Roy Upendra Nath (2005) Ed. "Watershed Management and Sustainable Development", Kanishka Publishers, New Delhi

Jally, M. K., Marothaia, D. K. and Agarwal, D. K. (1995), Managing dryland watershed development Programme : Lessons of Nartora Project. *Indian Journal of Dryland Agricultural Research and Development,*10 (2) : 115-130.

Jauhari V.P.(2002) *Sustainable Development of Water Resources*. Mittal Publication New Delhi.

Jodha N S., 2001 Life on the Edge: Sustaining Agriculture and Community Resources in Fragile Environments. New Delhi. Oxford University Press. 2001.

JSYS, (2003). Concept Note, Jala Samvardhane Yojane Sangha, Nodal Office, Bangalore.

Kalyan Kumar B.M. (2007) "An economic evaluation of NWDPRA and Sujala Watershed Programme in northern Karnataka - A Comparative Study" Unpublished M.Phil Thesis submitted to the University of Agricultural Sciences, Dharwad.

Kerr John (2002) Watershed Development, Environmental Services, and Poverty Alleviation in India. *World Development* Vol. 30, No 8:pp.1387–1400.

Khanaka K and Bhayah Anjana (2006) "Participatory watershed management", *Kurukshetra*, Vol. 84: pp.12-16.

Lele Sharachchandra, G Madhavi Latha, Shrinivas Badiger, Anand Vadivel (2009) Watershed development in Karnataka: a large-scale assessment of processes, sustainability and impacts. Centre for Interdisciplinary Studies in Environment and Development (CISED), Institute of Social Economic Change, Bangalore

Ministry of Environment and Forests (MOEF) (2002) *Empowering People for Sustainable Development*. MOEF, Government of India. New Delhi.

Ministry of Rural Development, Government of India (2012) MGNREGA Sameeksha, An Anthology of Research Studies on the Mahatma Gandhi National Rural Employment Guarantee Act, 2005, 2006–2012, edited and compiled by Mihir Shah, Neelakshi Mann and Varad Pande, Orient BlackSwan, New Delhi.

Ministry of Water Resources. *National Water Policy, 2002.* New Delhi: Ministry of Water Resources, Government of India.2002.

Mishra G.P. (2001) 'Man-Nature Problem and Natural Resource Management: A Conceptual Note' in Mishra G.P. and Bajpai B.K. (eds.) *Community Participation in Natural Resource Management*. Rawat Publications, Jaipur:pp.56-60.

Mishra Pradeep Kumar (2008) "Integrated Impact Assessment for Explaining Differential Impact of Watershed Development Projects" 'IAIA08 Conference Proceedings', 28th Annual Conference of the International Association for Impact Assessment, 4-10 May 2008, Perth Convention Exhibition Centre, Perth, Australia (available at www.iaia.org accessed on 14-5-2012).

Munikishore S., D. M. Chandaragi and L.V.Hirevenkangoudar(2008), Development of Scale to Measure the Attitude of Beneficiaries Towards Sujala Watershed Project. *Karnataka J. Agric. Sci.*, 21 (1): pp. 144-145.

Nadkarni M.V. "Commons, Development and the Poor" in Dinesh K. Marothia (ed.) "Institutionalizing Common Pool Resources", Concept Publishing Company: New Delhi. pp.79-81.

Navalawala B N (1998) "Watershed Management for Sustainable Development" *Yojana*, Vol-42, No-11:pp.5-14.

Ninan, K.N. and S. Lakshmikanthanthamma (2001) Social Cost-Benefit Analysis of a Watershed Development Project in Karnataka, India, *Ambio: A*

Journal of Human Environment, Royal Swedish Academy of Sciences, Sweden, Vol 30, No 3:pp. 157-161.

Palanisami K., D. Suresh Kumar, S. P. Wani, Mark Giordano (2009) "Evaluation of Watershed Development Programmes in India Using Economic Surplus Method" *Agricultural Economics Research Review.* Vol. 22: pp. 197-207.

Parikh Kirit S (1996): "Equitable Sustainable Development of Gujarat", *Economic and Political Weekly*, Vol-31, No.19:pp.1151-1164.

Parizenganeh Abdol, Hamid Jalalian and Mohamoud Yaznani (2008) in Sengupta M and Dalwani R (eds.), "Evaluation of the socio-economic and environmental impacts of the watershed management projects: A case study of the Zanjan river restoration project" Proceedings of Tall 2007, The 12th World Lake Conference: pp.1214-1219.

Perrings Charles (1997) The Value of Biodiversity for Sustainable Economic Development. In: P Pushpangadan (eds). *Conservation and Economic Evaluation of Biodiversity.* New Delhi. Oxford and IBH Publishing Co Pvt. Ltd.

Planning Commission (2000) *Mid Term Appraisal of Ninth Five Year Plan (1997-2002).* Planning Commission, Government of India, New Delhi.

Planning Commission (2003) *India's Five Year Plans Complete Documents,* Academic Foundation, New Delhi.

Raina K K (2004) "Sustainable Mountain Agriculture and Rural Livelihoods through Community Based Watershed Development- Lessons from Doon Valley (Uttranchal)" *Man and Development*, Vol-26, No-1: pp.93-96.

Rajgopalan V (1991) *"Integrated watershed development in India: Some problems and prospective". Indian Journal of Agricultural Economics*, Vol.46, No.3:pp.241-250.

Rajput A.M. and Patidar O.P. (2003) "A sustainability of Rajiv Gandhi Watershed Technology in Kargaon, District of Madhya Pradesh", *Indian Journal of Agricultural Economics,* Vol. No : p.513.

Rajput, A. M., Verma, A. R., and Shinde, R. (1994) Impact of watershed development programme on crop productivity in Western Madhya Pradesh. *Crop Research*, 8, 2: pp. 253-261.

Raju K.V., and Amarnath, H.K. (2001) Irrigation subsidies in Karnataka: A growing constraint for reforms. Working Paper No. 93, Institute for Social and Economic Change, Bangalore.

Ramesh R.S. (1999) *"Participatory Role in Watershed Development: Some Issues"*, *Southern Economist*: p.15-16.

Rao, Hanumantha Committee 1994 (2000): *Report of the Technical Committee on Drought Prone Areas Programme and Desert Development Programme*, Ministry of Rural Development, New Delhi.

Ram Mohan Rao, M. S., Padmaiah, M., Reddy, K. K. and Patil, S. L.(1995), Increased oilseed production through sunflower in the semi-arid tropics of Andhra Pradesh. *Indian Journal of Dry land Agricultural Research and Development,* 10 (2):pp. 164-171.

Rao Narasimha S.(2010) Impact assessment of watershed programs in Uttar Pradesh National Institute of Rural Development (NIRD), Government of India (GoI) and Watershed Support Services and Activities Network (WASSAN)., Hyderabad.

Rao U.R. (1996) *Space Technology for Sustainable Development*. New Delhi. Mc Grow Hill Publishing Company.

Rao Srinivas, Y.V.N.Krishna Murthy, S. Adiga and E. Ammineedu (2003) "Performance Index for Watershed Development" Journal of Indian Geophysical Union, Vol. 7, No. 4: pp.239-247.

Reddy and Rao (1999) *"Watershed development programmes in India; Experiences, issues and future agenda"*, *Journal of Rural Development*, NIRD 18 (4): pp.335-358.

Reddy V Ratna (1995): "Environment and sustainable development: conflicts and contradictions", *Economic and Political Weekly*, Vol-30, No.12:p.A-21.

Reddy V Ratna and Soussan John (2004) "Assessing the Impacts of Watershed Development Programmes: A Sustainable Rural Livelihoods Framework" *Indian Journal of Agricultural Economics*, Vol-59, No-3:pp-331-343.

Reddy Y.V.R., G. Sastry, B. Hemalatha, Om Prakash and Y.S. Ramakrishn (2004) Evaluation of watershed development programmes in India. ISCO 2004 - 13th International Soil Conservation Organisation Conference – Brisbane.

Sakthivadivel, R., Gomathinayagam, P. and Shah, T., (2006) Rejuvenating tanks through local institutions. *Economic and Political Weekly*, 39(31):pp.3521–3526.

Samra J S (1998) "Watershed Management for Sustainable Agriculture" in Ecological Agriculture and Sustainable Development, Vol. I, Edited by G S Dhaliwal, N S Randhawa, Ramesh Arora and A K Dhawan, Indian Ecological Society, Ludhiana and Centre for Research in Rural and Industrial Development, Chandigarh.

Silori, C. S., Megha Shukla, C K Jalajakshi and Mary Abraham, 2008, "Social Cost-Benefit Analysis of Karnataka Watershed Development (KAWAD) Project, Karnataka, India," *International Journal of Sustainable Development and World Ecology*, Vol. No.2: 150-177.

Singh, H. B., Pande, V. C. and Patel, A. P., 1995, Economic assessment of conservation practices and management on marginal lands of Mahi ravines. *Indian J. Soil Conservation.*, Vol. **3, No** 1 :pp. 77-81.

Singh Prem, H.C. Behera and Aradhana Singh (2010) Impact and effectiveness of watershed development programmes in India. Centre for Rural Studies, Mussoorie.

Shiva M.P. (1998) *Inventory of Forest Resources for Sustainable Management and Biodiversity Conservation*. New Delhi. Indus Publishing Company.

Shivasubramaniya, K. (2006) Sustainable development of small water bodies in Tamil Nadu. *Economic and Political Weekly,* Vol. 40, No 26: pp. 2854–2863.

Singh Mridula and Lal Murari (2001) 'Participatory Management of Natural Resources' in Mishra G.P. and Bajpai B.K. (eds.) *Community Participation in Natural Resource Management,* Rawat Publications, Jaipur: pp. 13-34.

Srivastava S.P. 'Sustainable Development: Issue and Consideration' in Iyer Gopal K. (ed.) *Sustainable Development: Ecological and Socio-cultural Dimensions,* Vikas Publications, New Delhi :pp.3-12.

Sundaram K.V. (1993) 'District Planning for Sustainable Development' in Gupta N.L. and Gurjar R.K. (eds.) *Sustainable Development* –Vol I., Rawat Publications. Jaipur: pp. 23-42.

Sury M.M. (2001) *India A Decade of Economic Reforms 1991-2001,*New Century Publications, New Delhi.

Swarnalatha, A., Kaushal, R. C. and Grewal, S. S. (1994) Economic viability of watershed management project selected to rehabilitate degraded Aravali foot hills of Haryana. *Indian Journal of Agricultural Economics,* Vol. 49, No 4 : pp.591-600.

Vaidyanathan, A, (2006): India's Water Resources: Contemporary Issues on Irrigation, Oxford University Press, New Delhi.

Vaidyanathan, A.,(1992) Strategy for development of tank irrigation. Madras Institute of Development Studies, Madras.

Weinberger Morris L. and Robert C. Otte (1957) Economic Evaluation of the Small Watershed Program Proceedings of the Annual Meeting of the American Farm Economic Association: *Journal of Farm Economics*, Vol. 39, No. 5: pp. 1256-1268.

Willcock, W., (1984) *Ancient Systems of Irrigation in Bengal.* BR Publishers, New Delhi.

World Bank (2006), Monitoring and Evaluating the Poverty Impacts of Agricultural
Water Investments: Agricultural and Rural Development Notes, No 15, World Bank, Washington DC.

World Bank (2011), Innovations in Development, Issue No 2, World Bank, Washington DC.

Online Sources

Biradar N.B. (2008) A study on impact of income generating activities on sustainable rural livelihoods of KAWAD project beneficiaries. Thesis submitted to the University of Agricultural Sciences, Dharwad [available at etd.uasd.edu/ft/th9697.pdf accessed on 22-10-2012].

Buhl Solveig Buhl and Rahul Sen (2006) Indo-German Development Cooperation

Natural Resource Management -A Preliminary Poverty Impact Assessment Delhi, Eschborn [available at www.oecd.org/dac/**poverty**reduction/38609109.pdf accessed on 18-10-2012]

Chandrudu Rama M V (2010) [available at www.indiawaterportal.org/.../ indiawaterportal... /Future%20Search_and Watersheds :: wassan at www.wassan.org/watersheds/Research_papers.htm accessed on 18-10-2012]

De Bruin Annemarieke, Monique Mikhail, Stacey Noel and Jennie Barron (2010). AWM Interventions and Monitoring and Evaluation: Potential Approaches at the Watershed Level. Stockhom Environment Institute, Sweden [available at www.sei-international.org/.../SEI-Project Report-DeBruin-...accessed on 7-7-2011]

Government of Karnataka (2003) Village Statistics, Rural Development and Panchayat Raj. Available at http://www.rdpr.kar.nic.in

[http://www.waterencyclopedia.com/Hy-La/Hydrologic-Cycle.html#ixzz28uHCFK71 accessed on 10.10.2012]

ICAR (2005) Impact evaluation of SIDIBO watershed in the State of Arunachal Pradesh treated under NWDPRA during IX TH Five Year Plan ICAR Research Complex for NEH Region, Ministry of Agriculture, Govt. of India, Meghalaya [available at www.icrisat.org/what-we-do/agro.../CA_Watersheds/.../Book-4.pdf. accessed on 9-2-2012).

Kerr John and Kimberly Chung (2001) Evaluating Watershed Management Projects, International Food Policy Research Institute , Washington, D.C. [available at www.capri.cgiar.org/pdf/CAPRIWP17.pdf accessed on 5.6.2008]

Kerr John, Ganesh Pangare and Vasudha Lokur Pangare (2002) Watershed Development Projects In India *An Evaluation* International Food Policy Research Institute , Washington, D.C. [available at www.ifpri.org/pubs/abstract/127/rr127.pdf accessed on 6.6.2008]

Milne, Grant (2007) India – Karnataka Watershed Development Project, Innovation in participatory watershed management to improve natural resource productivity and rural livelihoods. South Asia, Series 1, Note No. 3.World Bank, Washington. [[PDF]Karnatakafinmin.nic.in/ the...eco.../WB_assist_Karnataka_Watershed_Proj.pdf accessed on 17.8.2011].

Mishra Pradeep Kumar (2008) "Integrated Impact Assessment for Explaining Differential Impact of Watershed Development Projects" 'IAIA08 Conference Proceedings', The Art and Science of Impact Assessment 28th Annual Conference of the International Association for Impact Assessment, 4-10 May 2008, Perth Convention Exhibition Centre, Perth, Australia (available at www.iaia.org accessed on 1.1.2012)

Nicholas Antony (2006) Rural watershed development projects: An evaluatory study of two NWDPRA projects in the district of Calicut. Doctoral thesis submitted to Mahatma Gandhi University , Kottayam, Kerala [available at www.mgutheses.in/page/about_book accessed on 14-6-2012]

OECD (2007) A practical Guide to Ex ante Poverty Impact Assessment. Organisation for Economic Co-operation and Development [available at www.**oecd**.org/data**oecd**/46/39/38978856.pdf *accessed on 18-10-2012).*

Palanisami K, Suresh Kumar D and Suhas P Wani. 2009. A Manual on Impact Assessment of Watersheds. Global Theme on Agroecosystems Report No. 53. International Crops Research Institute for Semi-Arid Tropics, Andhra Pradesh, India [available at www.intranet.icrisat.org/.../Watershed%20Impact%20Assessemnt_... accessed on 2-1-2012].

Pater Susan, Kim McReynolds and Robert Emanuel (2005) PART II: HYDROLOGY & WATERSHEDS: p.7 [available at WATERSHED BASICS PART I: WATER ... - University of Arizona cals.arizona.edu/watershedsteward/resources/docs/.../(8) Hydrology. accessed on 10-2-2012]

Ramanayya T.V., Nagadevara V. and Shyamal Roy (2007) Impact Evaluation of Watersheds in Karnataka State, Indian Institute of Management, Bangalore [available at www.icrisat.org/what-we-do/agro-ecosystems/CA.../Karnataka.pdf accessed on 23-1-2012].

Shah Amita, Rohit Devlal, Hasmukh Joshi, Jayaram Desai and Rekha Shenoy (2004)

Benchmark Survey for Impact Assessment of Participatory Watershed Development Projects in India, Report submitted to Planning Commission Government of India, New Delhi. Gujarat Institute of Development Research, Ahmedabad [available at planningcommission.nic.in/reports/sereport/ser/stdy_wtrdev.pdf accessed on 17.8.2010]

TERI (2007) Mid Term Impact Assessment of Uttarakhand Decentralized Watershed Development Project. Project Report No. 2007SF04, The Energy and Resources Institute, New Delhi [available at www. teriin.org accessed on 17.7.2012]

Turton Cathryn (2000) Enhancing Livelihoods through Participatory Watershed Development in India, Working Paper 131, Overseas Development Institute, UK.[available at www.odi.org.uk/resources/docs/2744.pdf accessed on 4.8.2011].

The Economist (2011) "Indian rural welfare: Digging holes A maverick minister lays into a hallowed programme" The Economist, November 5,

2011[available at http://www.economist.com/node/21536642 accessed on 19-10-2012].

Wani Suhas P, Joshi PK, Raju KV, Sreedevi TK, Wilson JM, Shah Amita et al, Diwakar PG, Palanisami K, Marimuthu S, Jha AK, Ramakrishna YS, Meenakshi Sundaram SS and D'Souza Marcella (2008). Community Watershed as a Growth Engine for Development of Dryland Areas. A Comprehensive Assessment of Watershed Programs in India. Global Theme on Agroecosystems. Report No 47: International Crops Research Institute for the Semi-Arid Tropics (ICRISAT) and Ministry of Agriculture and Ministry of Rural Development. Andhra Pradesh, India [available at **ag.udel.edu/breg/swm/SWM/data/Publications/pages/Reports.htm].**

Vora Krunali (2011) "Application of Remote Sensing & GIS in Watershed Landuse Development" presented at National Conference on Recent Trends in Engineering & Technology 13-14 May 2011Gujarat [available at APPLICATION OF REMOTE SENSING & GIS IN **WATERSHED ...** www.bvmengineering.ac.in/docs/ published%20 papers/.../101024.pdf accessed on 14-2-2012].

Wright Tom and Harsha Gupta (2011) "India's Boom Bypasses Rural poor" , India Edition, The Wall Street Journal: Friday, April 29 [available at http://online.wsj.com/article accessed on 19-10-2012].

Websites:

The DFID approach to sustainable livelihood in a nutshell
[available at www.poverty-wellbeing.net/media/sla/docs/2-1.htm accessed on 5-7-2012]

The Sustainable *Livelihoods* Approach (available at www.ifad.**org**/sla/index.htm accessed on 8-9-2012]

Questionnaire No

COMMUNITY BASED WATERSHED MANAGEMENT AND POVERTY ALLEVATION: A STUDY OF SUJALA WATERSHED PROJECT IN KARNATAKA

Household (HH) Survey Questionnaire for beneficiaries/non beneficiaries of SWP

1. Survey Information

1.1 District :

1.2 Taluk :

1.3 Gram Panchayat :

1.4 Village :

1.5 Watershed name and location :

II. Household Information

2.1 Name of the household head :----------

2.2 Age of the household head :--------

2.3 Gender of the household head : 1= Male 2=Female

2.4 Contact Phone No. of Household Head: ----------

2.5 Religion_____ 1.Hindu 2.Muslim 3.Christian 4.Buddhist 5.Jain 6.Sikh 7.Others ____

2.6 Caste_____ 1.General category (castes) 2.Scheduled caste 3.Scheduled Tribe 4. Backward Castes 5. Others (_____) specify

2.7 Respondent: 1. Head of the Household 2. Person taking decision on agriculture/cultivation

2.8 Household size: Male------Female-----Total……No. of children aged 5 and below------

2.9 Type of family 1. Joint Family 2. Nuclear Family 3. Single

2.10 Do you own PDS card? 1. Yes 2. No

2.11 If yes to 2.10 specify 1= BPL 2= APL 3= Other----------(specify)

2.12 Are you a beneficiary of Sujala Watershed Programme? **1.Yes** **2. No**

III. Details of Dwelling

3.1 Nature of the dwelling? [ ] 1. Owned 2. Rental 3. Temporary

3.2 Type of house? [ ] 1. Katcha 2.Semi-pucca 3.Pucca (tiled house) 4. Pucca (cement roof)

3.3 What is the source of energy for cooking? [ ] 1. LPG 2. Firewood 3. Kerosene 4. Electricity 5. Cow dung cakes

3.4 What is the main source of drinking water? [ ] 1. Public well 2.Surface water 3.Public Tap 4. Handpump 5. Private well 6. Private Tap

3.5 Availability of individual toilet facility in the home premises [ ] 1.Yes 2. No

3.6 Electric connection to house [ ] 1.Yes 2. No

3.7 Availability of separate kitchen 1.Yes 2. No

IV. Household member information*Information on agricultural income only for Household head or person heading agricultural activities] [*not for children aged 5 and below]

ID	Name	Age years	Gender male-1 female-2	Education (code on page no.14)	Occupation (code on last page -no. 14)								
					Main	Annual Income (Rs.)	Sub Occupation						
							1	Annual Income(Rs.)	2	Annual Income(Rs.)	3 [Others]	Annual Income (Rs.)	
1.													
2.													
3.													
4.													
5.													
6.													
7.													
8.													
9.													
10.													

V. Farm level information (for HHs owning farm land)

5.1 Land holdings (in acres)

Sl. No.	Type of land	Owned	Leased in	Leased out	Total area	
					Before SWP	After SWP
1	Dry land					
2	Tank irrigated					
3	Well irrigated					
4	Canal irrigated					
5	Permanent fallow					
6	Total					

5.2 Details of agricultural area covered under watershed: 1.----------acres 2. Landless beneficiary 3. Non beneficiary 4. Don't know

VI. Asset Position

6.1 Farm assets

Sl. No.	Item	Before SWP (Nos)	After SWP (Nos)	**As on date for non beneficiaries (Nos.)**
1	Iron plough			
2	Wooden plough			
3	Seed drill			
4	Bullock cart			
5	Power tillers			
6	Cultivators			
7	Levelers			
8	Tractor			
9	Sprayer			
10	Duster			
11	Pump set			
12	Others			

6.2 Household assets

Name of Asset	Before SWP (Nos)	After SWP (Nos)	As on date for non beneficiaries (Nos.)
TV/VCD			
Music system			
Gas stove			
Electric Burner			
Steel Cupboards			
Freezer			
Bi-cycle			
Two wheeler			
Cable/DTH facility			
Personal computer/laptop			
Mobile phone			
Land phone			
Sewing machine			
Washing machine			
Other (specify)			

VII. Livestock and livestock products

Sl. No.	Type	How many do you own? (Nos.)			Present Value of livestock holdings (Rs.)
		Before	After	As on date for non beneficiaries	
1.	Cow				
2.	Buffalo				
3.	Poultry				
4.	Goat				
5.	Sheep				
6.	Pig				
7.	Ox				

VIII. Credit Information (Last year (2011)

Sl. No	Sources	Purpose (see code below)	Amount taken (Rs.)	Amount paid (Rs.)	Rate of Interest (%)	Old loan if any before 2011 (balance amount) (Rs).
1.	Banks					
2.	Cooperative Society					
3.	Moneylenders					
4.	SHGs					
5.	Others/Relatives					

1. Agriculture 2. Construction of house 3.Purchase of vehicle 4. Education 5. Health 6. Domestic purpose

IX. Awareness about Sujala Watershed Project (SWP)

10.1 Are you aware of the Sujala Watershed Project (SWP) being implemented in your village? **1. Yes 2. No**

10.2 If yes, from whom did you get to know of it ? (1. Panchayat members 2. SWP Official 3. Field NGO 4. Watershed Committee 5. SHG members 6. Friends/family members/relatives)

7. Village motivator 8. Any other

10.3 If yes to 10.1 do you know the objectives of SWP being implemented in your village? 1. **Yes, 2. No**

10.4 If yes, list any two objectives of SWP you are aware of?

1.----------

2.----------

10.5 Do you know that each beneficiary/household should contribute towards SWP either in cash or kind? 1. Yes, 2. No

10.6 If, yes how did you contribute?

Details	
Cash (Rs.)	**Kind**

X. Individual Benefits obtained by Beneficiaries in Sujala Watershed Project

Sl. No.	Details	Yes=1; No=2
A.	**Technological benefits**	
1.	Earthen bunds	
2.	Boulder bunds (rock bunds)	
3.	Vegetative cover	
4.	Farm pond	
5.	Check dam	
6.	Gokatte repairs	
7.	Diversion canal	
8.	Land leveling	
9.	Recharge pit	
10.	Others (specify)	
B.	**Improved Production Practices**	
1.	Training, awareness and guidance	
2.	Integrated Pest Management (IPM)	
3.	Cultivation across the slope	
	Inter cultivation	
C.	**Horticulture**	
1.	Seedlings for planting	
D.	**Forestry**	
1.	Seedlings for planting	
2.	Joint Forest Management (JFM)	
E.	**Economic benefits**	
1.	Increase in household agricultural income	
2.	Increase in wage rates (for the landless labourer)	
3.	Increase in income from non agricultural activities	
4.	Employment opportunities to self and family members	
5.	Diversification of crops (from food to cash crops)	
6.	There is increase in agricultural yield due to SWP	
7.	Increase in cultivated area	
8.	Increase in credit facilities	
9.	I often try new Watershed management practice I learnt/heard about.	
10.	I don't believe in SWP methods	
F.	**Indirect benefits**	
1.	Ground water recharge	
2.	Control of flood risks	

XI. Beneficiary Perceptions on Sujala Watershed Project (SWP)

Sl. No.	Details	Perceptions				
		SA = Strongly agree	A = Agree	UD = Undecided/ Don't know	DA = Disagree	SDA = Strongly Disagree
	Training provided by SWP are monotonous and not practical					
	SWP has benefitted only the big farmers					
	SWP has helped landless farmers in undertaking income generating activities					
	SWP has increased the use of fertilizers and pesticides					
	SWP has improved soil-moisture in the fields					
	There is increase in vegetation cover in the village after SWP					
	Water table has gone up due to SWP					
	SWP has encouraged and increased community participation in watershed development activities					
	There is no accountability and transparency in conducting the watershed activities					
	SWP has reduced migration of labourers in village					
	SWP has positive impact on control of soil erosion and arrest of run-off water					
	Increase in availability of fodder to animals					
	Due to SWP farmers have shifted from food grains to commercial crops					
	SWP has increased the activities of SHGs/No of SHGs in the village					
	SWP has resulted in increase in employment opportunities to poor/landless					
	There is improvement of village common grazing land					
	SWP has resulted in easy availability of seeds and fertilizers					
	There is favoritism in work allotment under SWP					
	There is favoritism in providing credit under SWP					
	Ground water recharge					
	Pest and disease control					
	Facilitate pollination					
	Improved Wild life habitat					
	Reducing risks of drought					
	Improvement in veterinary services					
	Overall SWP is a boon to village economy					
	Any other (specify)					

XII. Cropping Pattern : [Before and after SWP]

Season	Crop	Total cultivated Area (Acres)		Irrigated (Acres)		Yield (Qtl/Acre)		Value (Rs./Qtl)	
		Before/without	After	Before/ without	After	Before/ without	After	Before/ without	After
Kharif									
Rabi									
Summer									

XIII. Net cropped area

Before/ without (acres)	After (acres)

XIV. Labour

14.1 Labour used in agricultural activities (one agricultural year)

Before/without (man days)				After (man days)			
Family		Hired		Family		Hired	
M	W	M	W	M	W	M	W

14.2 No of days of gainful employment (for the landless)

Before/ without (man days)	After Period (man days)

14.3 No of days migrated in search of employment

Before /without (man days)	After Period (man days)

XV. Wage rates available in the village

Before/without (Rs.)				After Period (Rs.)			
Family		Hired		Family		Hired	
M	W	M	W	M	W	M	W

XVI. Economics of Horticulture Crops.

A. Establishment costs

Sl. No.	Crop	Total costs (Rs.)	
		Before / without (Rs.)	After Period (Rs.)
1.			
2.			
3.			
4.			
5.			

B. Returns from crop

Sl. No.	Crop	Before / without		After Period	
		Yield / Acre	Net returns (Rs)	Yield / Acre	Net returns (Rs)
1					
2					
3					
4					
5.					

XVII. Economics of dairy enterprise

A. Variable costs

Sl. No.	Particulars	Total Costs (Rs.)	
		Before / without	After Period
1	Feed and fodder		
2	Water		
3	Electricity		
4	Insemination		
5	Medicine		
6	Veterinary service and supervision		
7	Others (specify)		

B. Returns

Sl.No.	Particulars	Before / without		After Period	
		Total Qty (units)	Net returns (Rs.)	Total Qty units)	Net returns (Rs.)
1	Milk production (per location)				
2	Dung production				
3	Sale of animals				
4	Any others				

XVIII. Mass media participation

Sl. No.	Mass media sources	Possessed	Programs	Frequency of use					
				Before / without			After Period		
				Regular	Occasional	Never	Regular	Occasional	Never
1	Radio		Agri.programs / Information						
			News						
			Entertainment						
2	Television		Agri.programs / Information						
			News						
			Entertainment						
3	News Paper		Agri.programs / Information						
			News						
			Entertainment						
4	Farm magazine		Agri.programs / Information						
			News						
			Entertainment						

XIX. Organizational participation

Indicate your participation in various social organizations as member or office bearer

Sl. No.	Institution	Member	Office bearer	Frequency of use					
				Before / without			After Period		
				Regular	Occasional	Never	Regular	Occasional	Never
1	Gram panchayat								
2	Farmers service cooperative society								
3	KMF (Milk) society								
4	Youth club								
5	SHG								
6	WUA (Watershed User Association)								
7	Co op-Banks								
8	Others (TP/ZP)								

XX. Extent of participation of farmers in community watershed management

Sl.No.	Watershed users activities	Extent of participation		
		Regularly	Occasional	Never
A. Watershed rehabilitation				
(1) Planning / preparation				
1	Preparation of social map			
2	Preparation of resource map			
3	Collection of facts about watershed			
4	Household survey			
5	Identification of encroachment area			
6	Identification of major problem in watershed			
7	Deciding the selection of site for check drams			
8	Deciding about creation of dead storages			
9	Decision regarding required irrigation water			
10	Decision regarding intervention in watershed			
II. Implementation				
1	Afforestation in watershed foreshore			
2	Arrangement of labour			
3	Supervision of watershed management			
B. Crop Planning				
1	Projecting irrigated area			
2	Deciding the crops based on water availability			
3	Deciding suitable management practices			
4	Using water based on critical stages of crops			
5	Integrated crop management			
6	Participation in group meeting or gram sabha about watershed management			
7	Deciding number of irrigation			
8	Attending to repair and maintenance			

XXI. Newly introduced crops in watershed development program

Sl. No.	Particulars	Crops	**Area (Acre)**
1	Cereals		
2	Pulses		
3	Oil Seeds		
4	Vegetables		
5	Commercial crops		
6	Horticulture Crops		
7	Forestry Plants		
8	Fodder crops		

XXII. Seedlings planted under Horticulture and Forestry activities

Sl. No.	**Crop**	**No. of Seedlings planted**	**% of seedlings survived**
1	Mango		
2	Banana		
3	Sapota		
4	Tamarind		
5	Cashew		
6	Mallige		
7	Coconut		
8	Jamun tree		
9	Pongamia		
10	Neem		
11	Teak		
12	Acacia		
13	Jathropa		

XXIII. SHG Membership and Benefits

23.1 Is anybody in your family member of SHGs: 1. Yes 2. No

23.2 If yes how many are members?----------Nos

No of members before/ without Period	No of members after Period

23.3 Has any one from above taken loan through SHG? 1. **Yes, 2. No**
23.4 Has it helped the family member in starting fresh activities? 1. **Yes, 2. No**

23.5 If yes, give details of activity.

a) Animal husbandry
b) Non-agricultural activities
d) Small Business
e) Handicrafts
f) Vending
g) Others

23.6 Has the above activity helped the family to earn income (over and above the costs)? 1. **Yes, 2. No**

23.7 If yes, how much is the additional income earned per month from SHG activity? Rs.----------(per month)

XXIV. Details of Savings

Sl. No.	Source	Monthly saving amount (Rs.)	Total cumulative savings (Rs.)	Since when (year)
1.	Bank SB			
2.	RD			
3.	FD			
4.	Post Office			
5.	Chit Fund			
6.	LIC			
7.	SHG			
8.	Others (specify)			

XXV. Additional Employment gained due to SWP

Name & ID No of the family (take from table in Q.IV)	Agriculture			Non-Agriculture		
	Place	No.of Days	Wage Rate	Place	No.of Days	Wage Rate

XXVI. Annual Income

Sl. No.	Source of Income	Annual Income (Rs.)	
		Before/without	After (last Year)
1	Agriculture		
2	Allied activities (like ; poultry, diary, goat/sheep rearing, etc)		
3	Business		
4	Agricultural wages		
5	Non-agricultural wages		
6.	Salaried Employment in private		
7.	Salaried Employment in govt.		
6	Others (specify)		

XXVII. EMPLOYMENT / VOCATIONAL TRAINING

27.1 Did anyone from the family received training for self employment (SEP)? 1. **Yes, 2. No**

27.2 If yes, please provide details

Sl. No.	Question	Coding Categories	
1)	**Did you attend any self employment training conducted by RDTES?**	Yes-1; No-2	
2)	**What kind of self employment training you have attended?**	Tailoring……..	A
		Doll making……..	B
		Embroidery……..	C
		Readymade garments…….	D
		Weaving……	E
		Dairy ……..	F
		Poultry ……	G
		Others ……..	H
3)	**After giving training, what support the organization gives you?**	Financial support……..	A
		Supply of raw materials …..	B
		Marketing facility……..	C
		Other support …….	D
4)	**Did you face difficulty in finding market for your products?**	**Yes-1; No-2**	
5)	**Where do you sell your product?**	Village itself……	A
		Nearly village ……	B
		Taluka market……	C
		Other urban place within State	D
		Outside the State ……	E
		Others ……	F
6)	**How much income do you get in a month from your work?**	Rs. 500 or less ……1	
		Rs.501 to 750……2	
		Rs.751 to 1000 …… 3	
		Rs.1001 to 1500 ……4	
		Rs.1501 to 2000 ……5	
		Rs.2000 and above ……6	

7)	**Are you satisfied with increased income?**	Highly Satisfactory……..1 Satisfactory ……..2 Cannot say …….. 3 Not satisfied ……..---.4 Highly unsatisfactory ……5	
8)	**Do you feel SEP training helped you?**	Yes-1; No-2	
9)	**What way did it help you?**	**Improve the chance of getting job** **Finding vocation……** **Given the job opportunity…** **Become self employment** **Income increased……** **Others ……**	A B C D E F

XXVIII. Rank facilities that you wish to have in the village according to their importance (as perceived by households)

Sl. No.	Facilities	Ranking
	Improved medical facilities	
	Approach Roads	
	Individual toilets	
	Community toilets	
	Drinking water	
	Improved Bus Service	
	Irrigation	
	Credit/loan facility	
	Banks	
	Better educational facilities	
	Health care facilities	
	Watershed development	
	Veterinary services	
	Continuous provision of electricity	
	Any other (Specify)	

XXIX: NGO involvement in SWP activities

Sl. No.	Activity	Responses	
		Yes	No
i)	Involvement of Gram Panchayats in management, monitoring and implementation of watersheds		
ii)	Community management of watersheds after completion of the project		
iii)	Change in cropping pattern		
iv)	Employment generation		
v)	Migration		
vi)	Promotion of Self Help Groups		
vii)	Developing income generating activities		
viii)	Promoting social forestry for vegetation cover		
ix)	Promoting availability of fodder for livestock		
x)	Positive impact of MNREGA		
xi)	Making facilities for drinking water		
xii)	Follow up of the project implementation		

Comments by Investigator:

Name of the Investigator_____

Date:

Code sheet

Education:

1- Illiterate
2- Literate without formal schooling
3-Primary (up to 5th class)
4 Middle (up to 7th class)
5- Matriculate
6- Intermediate
7- Graduate/Diploma
8- Above graduation

Occupation:

1.Own-farm agriculture
2.Hired agriculture labour
3.Non- agricultural labour
4.Self-owned small business
5.Salaried in private enterprise
6. Salaried in govt. enterprise
7. Student
8. Old/Handicapped/Rtd.
9. Unemployed
10.Livestock maintenance
11. Household chores
12. Others (specify)

COMMUNITY BASED WATERSHED MANAGEMENT AND POVERTY ALLEVIATION: A STUDY OF SUJALA WATERSHED PROJECT IN KARNATAKA

Check List for Focus Group Discussions (FGDs)

[Gram Panchayat President, members, village elders, landless labourers, farmers, SHG members, youth representatives]

[Before and After SWP situation]

1. Role of Gram Panchayats in Management, monitoring and implementation watersheds
2. Involvement of NGOs-Responsibilities and follow-up
3. Selection of beneficiaries
4. Community management of watersheds after completion of the project
5. Change in total area under cultivation
6. Change in land under irrigation
7. Percentage of non arable land brought under irrigation
8. Change in cropping pattern
9. Employment generation
10. Migration
11. No of SHGs
12. Income generating activities
13. Impact of MNREEGA
14. Availability of drinking water
15. Availability of water for other uses
16. Vegetation cover (social forestry)
17. Availability of fodder
18. Availability of fuel wood
19. Duration of Sujala Watershed Project
20. Overall implications of Sujala Watershed Project

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AKSHARA GRANTHALAYA
ACC.NO. 049417